

LIST OF ACRONYMS

BMO	Biological Mitigation Ordinance
Cal-IPC	California Invasive Plant Council
CDFG	California Department of Fish and Game
cm	centimeter
City	City of San Diego
Corps	U.S. Army Corps of Engineers
County	County of San Diego
DEM	digital elevation model
EOMSP	East Otay Mesa Specific Plan
GIS	Geographic Information System
GPS	Global Positioning System
HELIX	HELIX Environmental Planning, Inc.
Lonestar Parcels	Lonestar Ranch Property
m	meter
MHPA	Multi-Habitat Planning Area
MSCP	Multiple Species Conservation Program
QCB	Quino checkerspot butterfly
RWQCB	Regional Water Quality Control Board
SR	State Route
USFWS	U.S. Fish and Wildlife Service

THIS PAGE INTENTIONALLY LEFT BLANK

1.0 INTRODUCTION

This restoration plan fully mitigates for direct impacts to vernal pools and road pools with fairy shrimp resulting from implementation of the Otay Business Park (proposed project). Additionally, this plan includes mitigation measures for impacts to burrowing owl (*Athene cunicularia*), rare plants, and Quino checkerspot butterfly (*Euphydryas editha quino*; QCB). The mitigation measures identified herein are based on those contained in the Otay Business Park Biological Technical Report (HELIX Environmental Planning, Inc. [HELIX] 2011a). The proposed mitigation is intended to meet the requirements of the Otay Business Park project's U.S. Fish and Wildlife Service (USFWS) Biological Opinion, U.S. Army Corps of Engineers (Corps) Section 404 Individual Permit, California Department of Fish and Game (CDFG) Section 1602 Streambed Alteration Agreement, Regional Water Quality Control Board (RWQCB) Section 401 Water Quality Certification, and County of San Diego (County) Biological Mitigation Ordinance (BMO). All restoration associated with this plan will occur at the Lonestar Ranch Property (Lonestar Parcels).

2.0 PROJECT DESCRIPTION

2.1 DEVELOPMENT PROJECT LOCATION

The project site (Assessor's Parcel Number 648-070-21) and adjacent off-site improvements are located in southeastern Otay Mesa within San Diego County, California (Figure 1). The property lies immediately north of the U.S./Mexico border, approximately one-half mile east of Enrico Fermi Drive. It occupies the southeastern quadrant of Section 31 within Township 18 South, Range 1 East of the U.S. Geological Survey 7.5-minute Otay Mesa quadrangle (Figure 2). The site is within the East Otay Mesa Specific Plan (EOMSP) area and is within areas designated in the County's Multiple Species Conservation Program (MSCP; County 1997) as Minor Amendment Areas and Minor Amendment Areas Subject to Special Consideration.

2.2 DEVELOPMENT PROJECT SUMMARY

The proposed Otay Business Park project is an industrial business park development located on 161.6 acres in Subarea 2 of the EOMSP. Proposed project development would impact 175.31 acres.

2.3 HABITAT/SENSITIVE SPECIES IMPACTS

HELIX prepared a Biological Technical Report that details the impacts and required mitigation for the Otay Business Park project (HELIX 2011a).

2.3.1 Vernal Pools

Implementation of the Otay Business Park project would impact a total of 10 vernal pools with a combined surface area of 0.14 acre (Table 1). Each of the vernal pools had at least one indicator species; however, the indicator species cover did not approach one percent in any pool at any time during the year. The pools are highly disturbed and exhibit very low species cover and

richness. The site has experienced years of agriculture, off-road vehicle use, and Border Patrol activity; most of the pools are almost completely unvegetated throughout the year, including during the rainy season. Vernal pool indicator species that were observed in one or more pools include San Diego button-celery (*Eryngium aristulatum* var. *parishii*), toothed downingia (*Downingia cuspidata*), flowering quillwort (*Lilaea scillioides*), and water pygmyweed (*Crassula aquatica*). Nine of the vernal pools occur on the hill in the south-central portion of the property, and most lie largely within disturbed roads. The largest pool on site (0.08 acre) occurs in a gentle depression on the eastern portion of the site, supports San Diego fairy shrimp (*Branchinecta sandiegonensis*), and is the only pool to contain San Diego button-celery and spreading navarretia (*Navarretia fossalis*). The large pool on the southern boundary supports Riverside fairy shrimp (*Streptocephalus woottoni*).

Table 1 OTAY BUSINESS PARK POOL IMPACTS (acre)	
Habitat	Corps Impacts
Vernal pool	0.14
Road pool	0.10
TOTAL	0.24

2.3.2 Road Pools with Fairy Shrimp

Road pools are ephemeral water-holding basins formed on heavily compacted dirt trails and roads that lack vernal pool indicator plant species (Corps 1997), but support sensitive animal species such as San Diego and Riverside fairy shrimp.

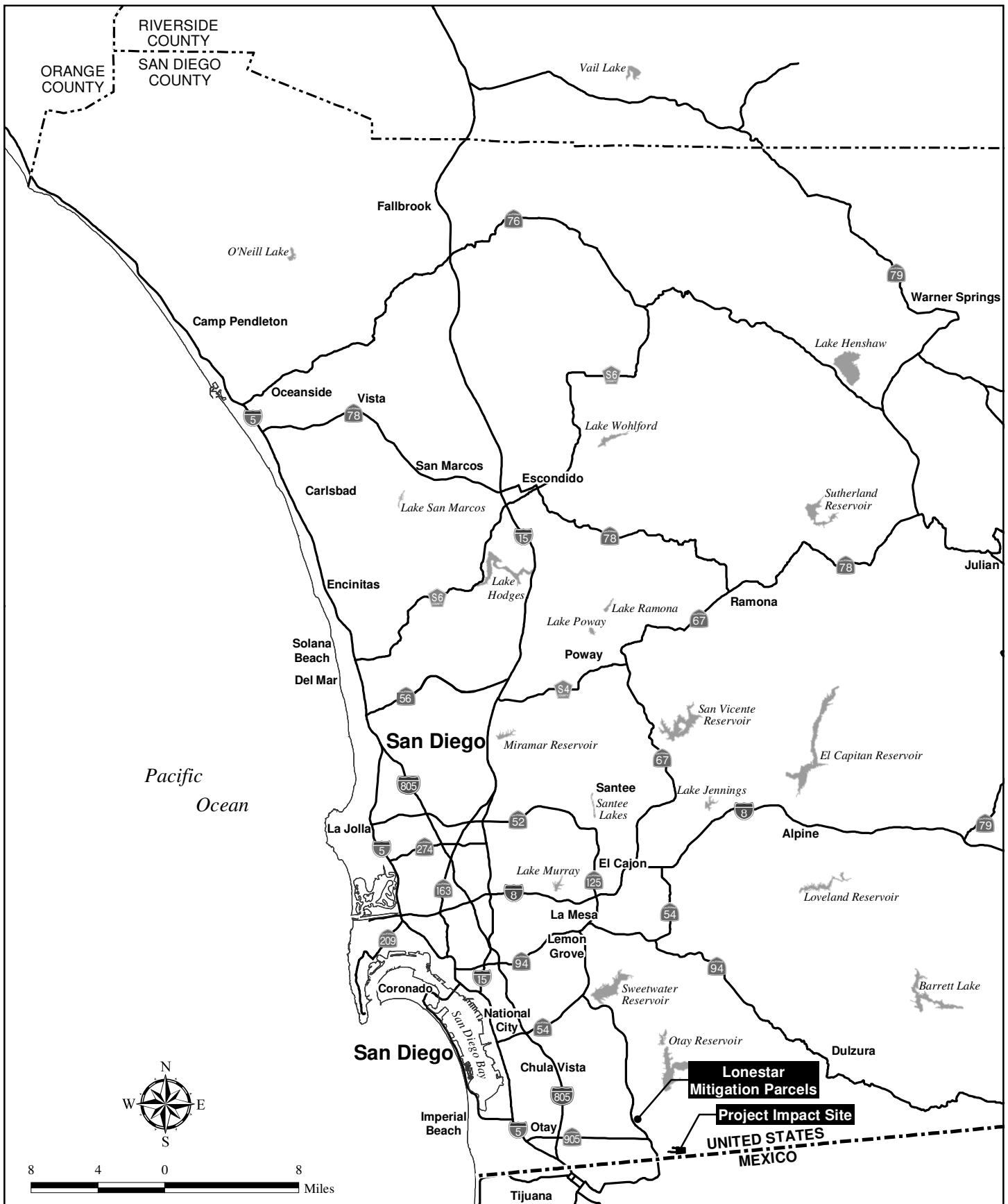
A total of 14 road pools with a combined surface area of 0.10 acre would be impacted by the Otay Business Park project (Table 1).

2.3.3 Burrowing Owl

The proposed project would impact 7 occupied burrowing owl burrows and approximately 175.31 acres of occupied habitat.

2.3.4 Rare Plants

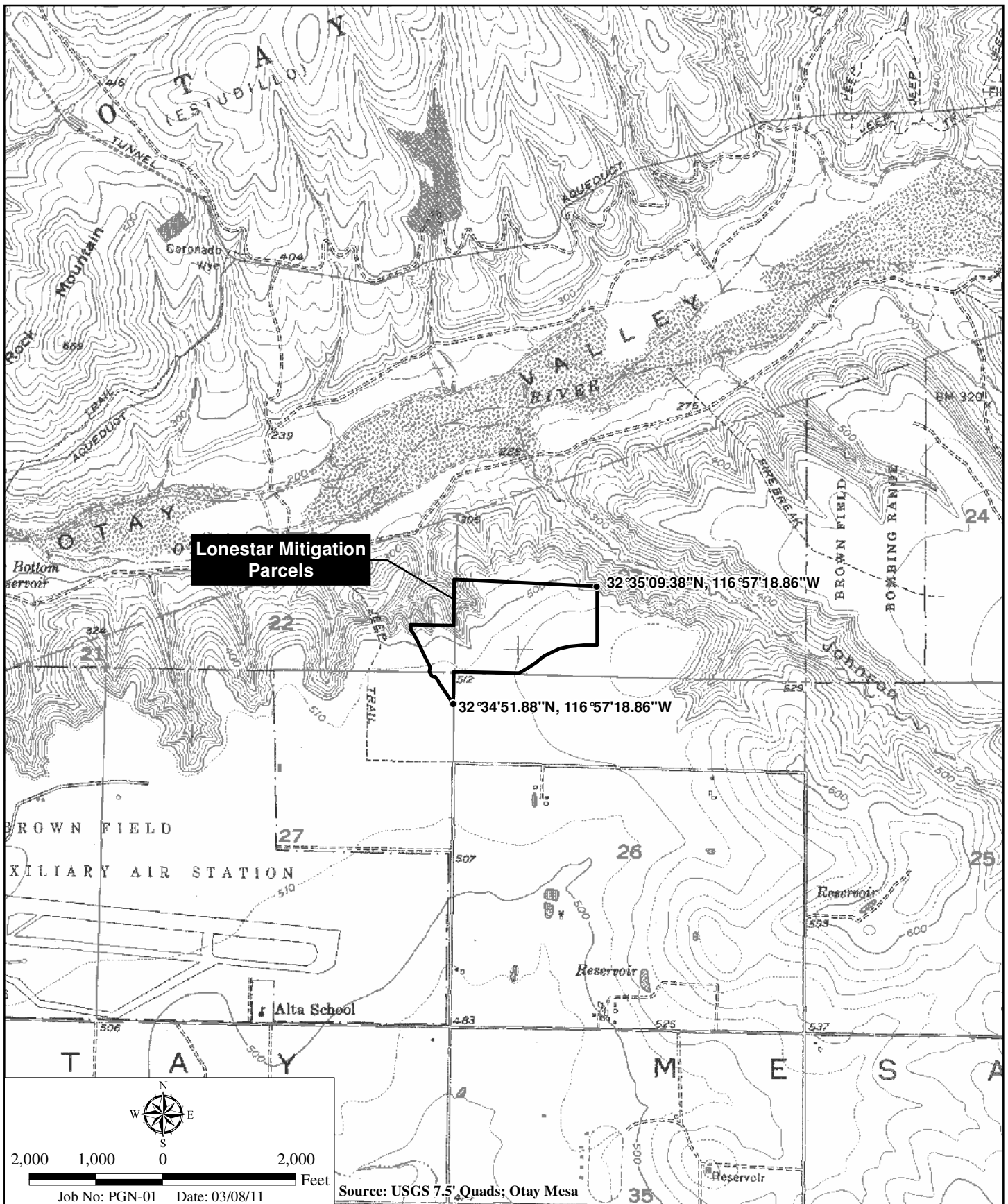
All of the sensitive plants recorded on the project site would be impacted by the proposed development, including small-flowered morning-glory (*Convolvulus simulans*; 5 individuals), variegated dudleya (*Dudleya variegata*; approximately 3,465 individuals), San Diego button-celery (3 individuals), San Diego barrel cactus (*Ferocactus viridescens*; 31 individuals), chocolate lily (*Fritillaria biflora*; 4 individuals), San Diego marsh-elder (11 individuals), and spreading navarretia (3 individuals).



E:\ArcGIS\PPGN-01 Arnaiz\Map\BIO\VP Restoration\Fig1_Regional.mxd -NM

Regional Location Map

VERNAL POOL PRESERVE RESTORATION PLAN FOR OTAY BUSINESS PARK



E:\ArcGIS\PPGN-01 Armaiz\Map\BTR\Fig2_Location.mxd -NJ

Project Location Map

VERNAL POOL PRESERVE RESTORATION PLAN FOR OTAY BUSINESS PARK

2.3.5 Quino Checkerspot Butterfly Habitat

The QCB observation location on the hill in the southern portion of the project site would be impacted by the proposed project. Dot-seed plantain (*Plantago erecta*) and potential nectar sources are abundant on the upper slopes of this hill, and occur in a scattered distribution within an approximately 3-acre area. Non-native grasslands throughout the site have some limited potential to provide nectaring resources. While QCB have not been observed on site since 2005, the entire 161.6-acre property supports habitat at least marginally suitable to support the QCB.

2.3.6 Functions and Services

The existing functions and services of the impacted vernal pools were assessed using the Individual Vernal Pool Fieldbook of the California Rapid Assessment Method (CRAM) for Wetlands v. 5.0.3 (March 2009). The purpose of the CRAM assessment is to provide a rapid, standardized, and scientifically defensible assessment of the status of a wetland. To conduct this assessment, 2 CRAM practitioners conducted a CRAM assessment according to the User's Manual: California Rapid Assessment Method for Wetlands v. 5.0.2 (Collins et. al., 2008) and other training materials located on the CRAM web site (www.cramwetlands.org). As part of this assessment, a variety of landscape context, hydrology, and structure attributes and metrics were assessed. The CRAM for individual vernal pools has not been fully calibrated; however, it represents a view into the condition of the pools that would otherwise not be represented in the monitoring efforts. Therefore, the CRAM scores will be used primarily for informational purposes and to potentially further the calibration effort on-going in central California. Results of the pre-project and pre-restoration CRAM assessments will be used for later comparison with post-restoration CRAM scores to determine how functions and services were replaced by the rehabilitation effort. Additional monitoring data will also be collected in order to evaluate success off the rehabilitation effort (see Section 8.0).

Five pools proposed to be impacted by project development were assessed on February 27, 2011 by HELIX biologists Sally Trnka and Amy Mattson. CRAM scores varied between 50 and 54 at the assessed pools, with a mean score of 52 (Appendix A). The Buffer and Landscape Context attribute score was between 45 and 48 for all of the analyzed pools due to little surrounding wetland habitat but good-sized buffer habitat dominated by non-native grassland and disturbed habitat. The Hydrology attribute score was high (92) for all of the pools since they all receive water as precipitation, follow the natural patterns of filling and drying, and there is no indication that dry season conditions are substantially controlled by artificial water sources (e.g., urban runoff). The Physical Structure attribute score was low for all of the pools (between 25 and 38) since they are simple depressions with one main slope and without many structural patch types, as defined by the CRAM fieldbook. All of the pools had relatively low scores for the Biotic Structure attribute (between 29 and 42) as a result of the pools being dominated by non-native species, the presence of none or few native species, and no vernal pool indicator species. Scoring sheets for the analyzed pools are included in Appendix A.

3.0 MITIGATION REQUIREMENTS

To ensure no-net-loss of jurisdictional areas as well as associated functions and services, the Corps requires compensatory mitigation for jurisdictional impacts. Jurisdictional impacts and mitigation are assessed by using a function-based assessment tool such as CRAM, coupled with more typical data such as richness of vernal pool flora, presence of target fauna, extent and duration of ponding, and percent cover of native and non-native flora. The Corps encourages the use of this type of function-based assessment for evaluating impacts to aquatic resources, as well as for aiding in establishing appropriate mitigation ratios and determining success criteria.

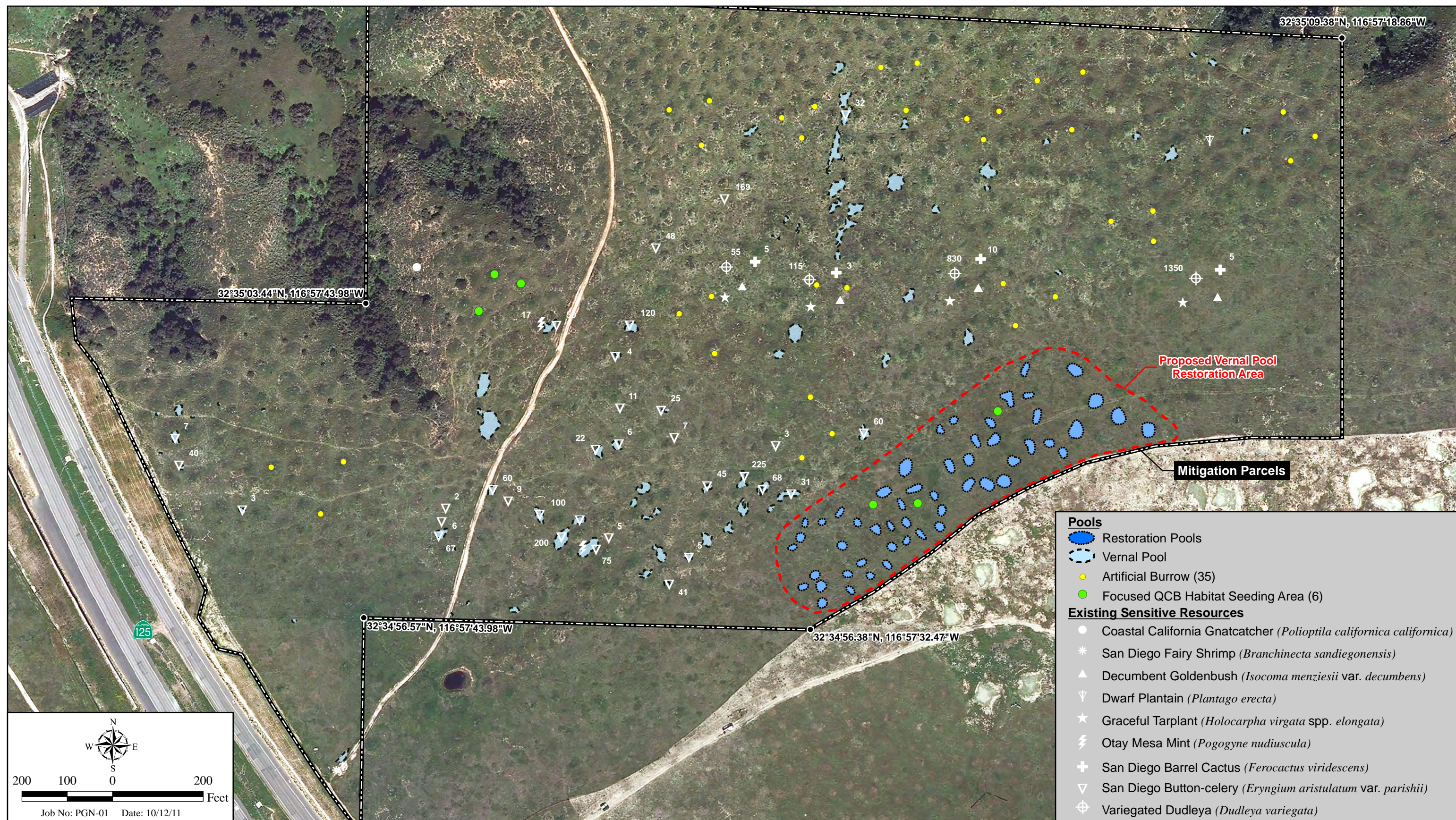
3.1 TYPE(S) OF HABITAT TO BE RESTORED

The total compensatory mitigation for impacts resulting from implementation of the Otay Business Park project is comprised of: on-site restoration and preservation; preservation, restoration, and enhancement of habitat on the 68.7-acre Lonestar parcels (Figures 3 and 4); and preservation of additional habitat at another location off site (for additional non-native grassland mitigation). This restoration plan deals only with the restoration and enhancement of the Lonestar Parcels.

3.2 VERNAL POOLS

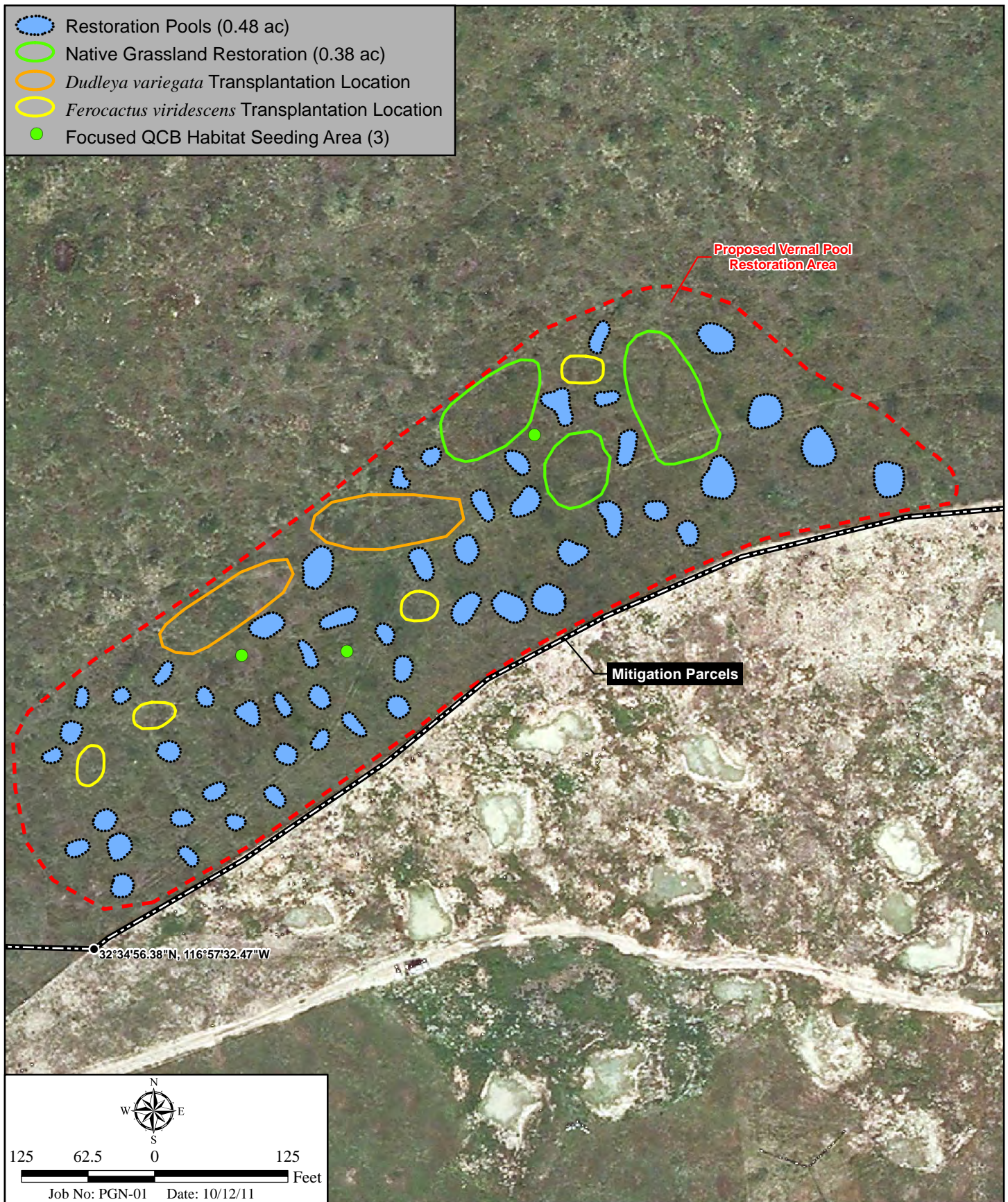
3.2.1 Vernal Pool Restoration and Watershed Enhancement

Mitigation for impacts to vernal pools and road pools with fairy shrimp would occur through vernal pool preservation and restoration on the Lonestar Parcels. Watershed enhancement also would occur at the Lonestar Parcels, which support 0.66 acre of vernal and road pools (Table 2). The preservation of pools refers to protecting existing pools and their associated watersheds from future development. Watershed enhancement involves the periodic removal of grass thatch, but does not include recontouring of existing basins or watersheds. Restoration of pools refers to the re-establishment of basins in appropriate clay soils and mima mound topography that historically supported vernal pools. The mitigation effort would restore 0.48 acre of vernal pools within the Lonestar Parcels. The restored vernal pools would support vernal pool plant indicator species (Corps 1997) and function as viable, self-sustaining vernal pool basins. The total mitigation (1.14 acres) would result in a combined mitigation ratio of approximately 5:1. This includes a vernal pool restoration ratio of 2:1. The mitigation program includes restoration of approximately 4.70 acres of vernal pool watersheds, including 0.38 acre of native grassland restoration



Existing Conditions and Planned Restoration at Lonestar Mitigation Parcels

VERNAL POOL PRESERVE RESTORATION PLAN FOR OTAY BUSINESS PARK



Vernal Pool Restoration Area

VERNAL POOL PRESERVE RESTORATION PLAN FOR OTAY BUSINESS PARK

Table 2 MITIGATION FOR IMPACTS TO VEGETATION COMMUNITIES (acres)						
VEGETATION COMMUNITY	TOTAL IMPACTS	MITIGATION				
		Target		Proposed		
		Ratio	Area	Preservation	Restoration	Total
Vernal/Road pool	0.24	5:1	1.14	0.66	0.48	1.14

3.2.2 San Diego and Riverside Fairy Shrimp Mitigation

The project applicant proposes to mitigate impacts to San Diego and Riverside fairy shrimp at a an approximately 5:1 ratio in conjunction with the vernal and road pool mitigation identified above. This mitigation may include salvage of soil containing fairy shrimp cysts to inoculate the restored pools with San Diego and Riverside fairy shrimp.

3.2.3 San Diego Fairy Shrimp Critical Habitat

The project applicant proposes to offset impacts to 114.4 acres of critical habitat through the preservation and enhancement of 62.2 acres of critical habitat and 1.3 acres of essential habitat located at the Lonestar mitigation site. Measures to improve the value of the critical habitat to San Diego fairy shrimp include the restoration of .48 acres of vernal pools capable of supporting this species and upland habitat restoration within the immediate watershed area (approximately 4.7 acres) of these new pools. The remainder of the mitigation area will be dethatched and subject to periodic removal of non-native grasses. It is anticipated that the removal of the thatch and non-native grasses will help improve the ability of the preserved pools on site to hold water and support the San Diego fairy shrimp (refer to Section 5.9.4). Additional measures to be conducted on the mitigation site include the installation of artificial burrowing owl burrows and introduction of QCB host and nectar plant species.

3.3 BURROWING OWL ARTIFICAL BURROW INSTALLATION

According to the BMO, mitigation for impacts to the occupied habitat must be through the conservation of occupied burrowing owl habitat or lands appropriate for restoration, management, and enhancement of burrowing owl nesting and foraging requirements at a ratio of no less than 1:1 for the territory of the burrowing owl.

The project applicant proposes to partially mitigate impacts to occupied burrowing owl habitat with habitat acquisition and enhancement at the Lonestar Parcels. Suitable habitat occurs throughout the Lonestar Parcels, and burrowing owls have been reported in a number of locations in the vicinity. To ensure suitable burrow opportunities are present within the mitigation area, the installation of 35 artificial burrows is included in the restoration effort.

3.4 RARE PLANT SALVAGE AND TRANSLOCATION

The project applicant proposes to mitigate impacts to variegated dudleya, San Diego button-celery, San Diego barrel cactus, and spreading navarretia through the salvage and translocation of the on-site populations to the Lonestar Parcels, and preservation of translocated and existing populations on the Lonestar parcels. Salvaged variegated dudleya and San Diego barrel cactus would be translocated to the Lonestar Parcels and incorporated into this vernal pool restoration area. San Diego barrel cactus also will be included in the Diegan coastal sage scrub planting palette (Section 5.7.2).

Impacts to chocolate lily would be mitigated with the preservation of 68.72 acres of habitat at the Lonestar Parcels, which includes approximately 50 chocolate lily individuals mapped in the northwestern corner. Chocolate lily seeds would be collected from the Otay Business Park site and applied to the vernal pool watershed restoration area.

Methods for translocation of sensitive plant species are included in this restoration plan in Section 5.5.

3.5 QUINO CHECKERSPOT BUTTERFLY

Because of the low quality habitat on site and small population (one individual observed in 6 years of focused surveys of QCB), the focus of the mitigation effort is on preservation/restoration of appropriate QCB habitat off site, as opposed to any direct attempt at establishing a new population. The project applicant proposes to mitigate for the loss of the QCB through preservation of historically occupied habitat on the Lonestar Parcels, which has been designated as QCB Critical Habitat. Additionally, host plant species and adequate nectar plants will be included in the vernal pool watershed restoration effort, and 6 QCB habitat focused planting areas will be created within the Lonestar parcels. Such measures would improve the habitat value of these historically occupied parcels for the QCB.

3.6 NATIVE GRASSLAND

The project applicant proposes to mitigate impacts to native grassland with the restoration of 0.38 acre of native grassland in the watershed enhancement around the restored vernal pools on the Lonestar Parcels.

4.0 MITIGATION SITE

4.1 LOCATION AND SIZE OF MITIGATION AREA

The project would cause direct and indirect impacts to sensitive vegetation communities, jurisdictional areas, and sensitive plant and animal species. The project applicant proposes to conduct mitigation for the loss of these sensitive resources with on-site preservation and restoration, purchase of mitigation parcels, and restoration within those parcels. The Lonestar Parcels were acquired to serve as partial off-site compensatory mitigation. The Lonestar Parcels

are 2 parcels adjacent to each other totaling 68.72 acres located within the City of San Diego (City), east of State Route (SR)-125 and north of Lonestar Road. These parcels occupy portions of Sections 22, 23, and 27 in Township 18 South, Range 1 West of the U.S. Geological Survey 7.5-minute Otay Mesa quadrangle (Figure 2). These parcels are approximately 3 miles northwest of the project site within the same Otay Mesa burrowing owl sub-population as the project site. All of the habitat on the Lonestar Parcels supports or has potential to support: burrowing owls, non-native grassland, vernal pools, road pools with San Diego fairy shrimp, and Diegan coastal sage scrub. Vernal pools and mima mound topography are present throughout much of the Lonestar Parcels. QCB were historically found in these parcels and the Lonestar Parcels support QCB larval host plants and potential nectar resources. Other County of San Diego sensitive species that occur on the Lonestar Parcels include:

- Otay mesa mint (*Pogogyne nudiscula*; a federal and state listed Endangered species and a County List A species)
- San Diego button-celery (a federal and state listed Endangered species and a County List A species)
- variegated dudleya (a County List A species)
- decumbent goldenbush (*Isocoma menziesii* var. *decumbens*; a County List A species)
- San Diego barrel cactus (a County List B Species)
- graceful tarplant (*Holocarpha virgata* ssp. *elongata*; a County List D species)
- chocolate lily (a County List D species)
- San Diego sunflower (*Viguiera laciniata*; a County List D species)
- Coastal California gnatcatcher (*Poliophtila californica californica*; a County Group 1 species).

The Lonestar Parcels are within the City of San Diego's Multi-Habitat Planning Area (MHPA), with County open space to the north, SR-125 to the west, and the SR-125 vernal pool and burrowing owl mitigation area to the south. The site can be reached by an unnamed dirt road from Lone Star Road. Access will be coordinated with Caltrans and Otay Crossings to minimize disturbance of the overall preserved area.

4.2 LOCATION OF VERNAL POOL RESTORATION

Vernal pool restoration would occur in an approximately 4.7-acre area on the Lonestar Parcels (Figure 4). This area has mima mound topography and non-native grassland. They currently are no vernal pools or water holding depressions within this area. Rare plant translocation would be co-located in the vernal pool restoration area.

4.3 LOCATION OF ENHANCEMENT AREAS

Vernal pool watershed enhancement will occur throughout the entirety of the non-native grasslands within the Lonestar Parcels.

4.4 LOCATION OF ARTIFICIAL OWL BURROWS

The creation of 35 artificial owl burrows will occur throughout the Lonestar Parcels (Figure 3). Artificial burrows would be placed in existing mima mounds and/or disturbed areas as appropriate. The siting of these burrows takes into consideration factors that may affect burrow site suitability (e.g., vegetative cover, relative elevation to surrounding landscape, distance from present/future development, and nearby human activity), spacing between burrows, availability of nearby foraging habitat, and threat of very localized events such as pets, fire, or vandalism.

4.5 OWNERSHIP STATUS

The mitigation site (Lonestar Parcels) has been purchased by Otay Business Park, LLC. Contact information is as follows:

Ricardo Jinich
Otay Business Park, LLC
4225 Executive Square, Suite 920
La Jolla, CA 92037
(858) 535-9000 x 222

As further discussed in Section 9.3, a Biological Open Space Easement or Conservation Easement dedication will be recorded over the vernal pool mitigation areas prior to initiation of project impacts.

4.6 EXISTING FUNCTIONS AND SERVICES OF MITIGATION AREA

The Lonestar Parcels are undeveloped with habitat consisting primarily of non-native grasslands over the mesa top, and high-quality Diegan coastal sage scrub in the canyons. Mima mound topography, one of the main characteristics of San Diego hardpan vernal pools, exists over the majority of the site. At least 7 sensitive plant species (Otay mesa mint, variegated dudleya, San Diego button-celery, decumbent goldenbush, graceful tarplant, chocolate lily, and San Diego barrel cactus) and 2 federally endangered animal species (coastal California gnatcatcher and San Diego fairy shrimp) inhabit the Lonestar Parcels (Figure 3; HELIX 2009).

The site has historically been disturbed by grazing, and by pedestrian and off-highway vehicle usage. The site serves as foraging habitat for migratory birds including sensitive raptor species. The adjacent SR-125 vernal pool restoration site was in the same condition prior to restoration and now, 3 years after installation, it supports successfully restored vernal pool habitat and occupied burrowing owl burrows.

Vernal pools on site support 2 federally endangered plant species (Otay mesa mint and San Diego button-celery). The existing pools hold water for limited amounts of time given average rainfall, making it difficult for these pools to support fairy shrimp. It appears that the dense cover of non-native grasses within the existing pools has a negative effect upon their ability to hold water.

5.0 IMPLEMENTATION PLAN

The restoration at the Lonestar Parcels will consist of several components, including:

- Initial dethatching of the entirety of non-native grassland on the Lonestar Parcels, including mowing of the site and removal of thatch.
- The restoration of 0.48 acre of vernal pools in an approximately 4.70-acre vernal pool restoration area
- The establishment of 0.38 acre of native grassland in the vernal pool restoration area
- The addition of Diegan coastal sage scrub plantings and seeding in the vernal pool restoration area
- Creation of 6 QCB habitat focused seeding areas
- Installation of 35 artificial burrowing owl burrows in mima mounds
- Translocation of rare plants to the vernal pool restoration area
- Enhancement of wildlife habitat

The site preparation, installation, and maintenance of these areas are described in detail in sections 5.4 and 5.5.

The initial cost estimate for site preparation, installation, and 5-year maintenance and monitoring of the mitigation site is approximately \$500,000. Prior to turning the site over to the long-term management entity, a Property Record Analysis (PAR) will be performed to identify the amount of the endowment to be provided for the long term management of the site.

5.1 TARGET FUNCTIONS AND SERVICES

The overall goal of this mitigation effort is to create high quality vernal pools that would at a minimum replace the functions and services lost by project implementation. With the completed restoration, it is expected that functions and services (water filtration, sensitive wildlife and plant habitat, etc.) that are currently being performed by both the existing pools on Lonestar and the reference site pools would be duplicated or improved in the restoration pools by the end of the 5-year mitigation effort. This realization of target functions and services would be documented by conducting CRAM assessments prior to impacts, post-rehabilitation, and at the end of Years 3 and 5 of the mitigation effort.

5.2 RATIONALE FOR EXPECTING IMPLEMENTATION SUCCESS

The mitigation site currently supports non-native grassland habitat with sensitive plant species, vernal pools (some with sensitive species), and potential QCB and burrowing owl habitat. This plan would enhance the watersheds of existing preserved pools, restore vernal pools, install 35 artificial owl burrows, restore native grassland habitat, salvage and translocate rare plants and seed, improve areas of QCB habitat, and implement habitat enhancements for other wildlife species.

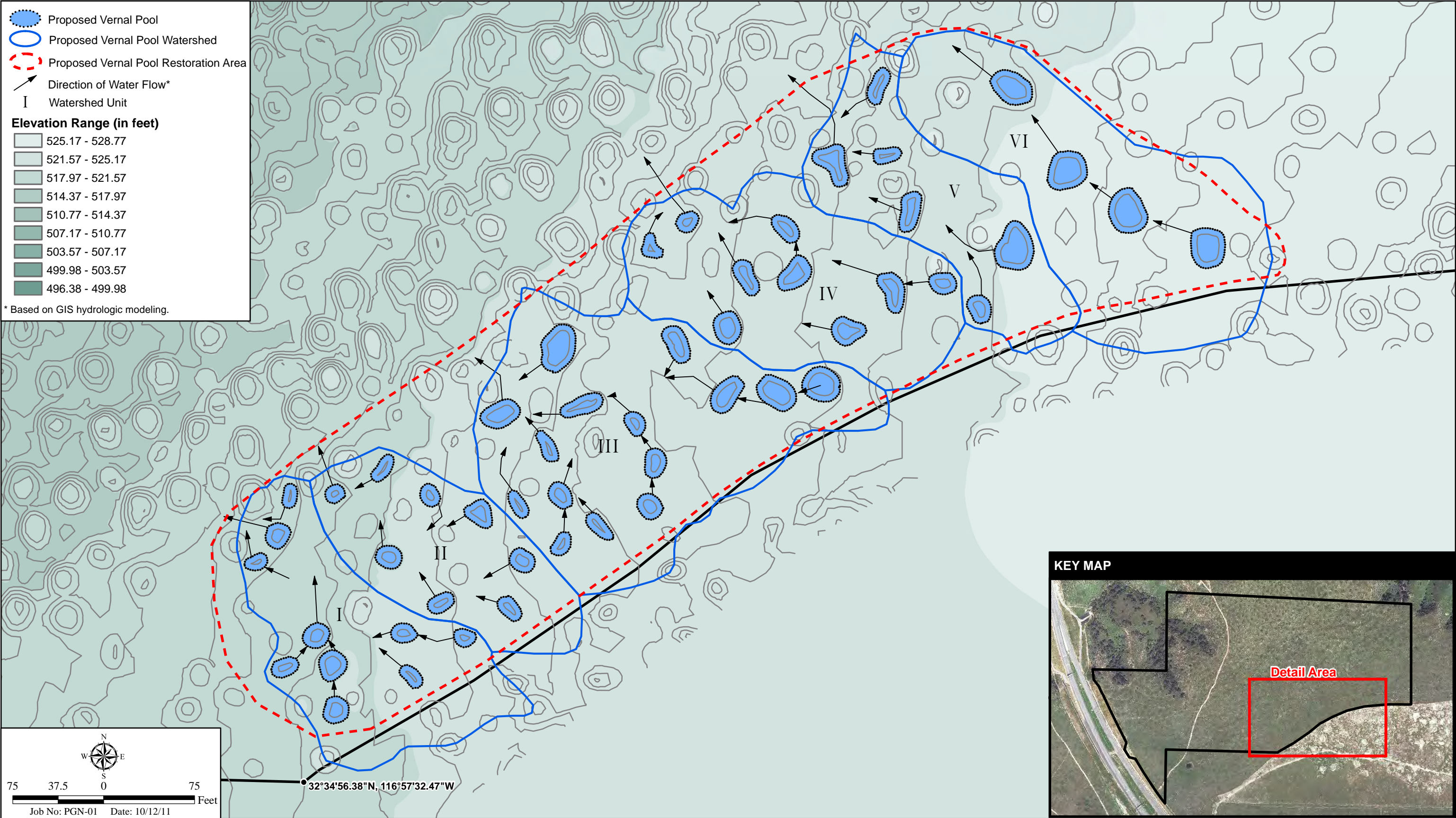
Variegated dudleya, San Diego button-celery, and San Diego barrel cactus have all been observed in grassland habitat on the Lonestar Parcels, so the habitat in these areas would be

appropriate to support the translocated plants and/or seed. Spreading navarretia occurs in vernal pools throughout Otay Mesa, so the vernal pool habitat on the Lonestar Parcels will be appropriate for this species.

A watershed analysis of several mound and basin vernal pool complex maps from Kearny Mesa and Otay Mesa found watershed to pool surface area ratios as low as 4:1, and commonly 6:1 or 7:1 (RECON 1997). Studies have shown that direct precipitation plays a more important role in pool filling than watershed contributions in more porous soils (Hanes and Stromberg 1998), while subsurface flow may have an effect on the duration of ponding.

A hydrological analysis of the proposed vernal pools and surrounding watershed area was conducted to determine the appropriateness of the proposed restoration. This analysis includes a delineation of the specific watershed areas (micro-basins) for each proposed pool complex and models inter-pool surface flows. The micro-basins delineation and modeled surface flows were obtained with a Geographic Information System (GIS) using the hydrological modeling capabilities of ArcView 9.2, and the Spatial Analyst and Arc Hydro GIS tools. A digital elevation model (DEM) was derived from the linear hypsography (6-inch contours) resulting in a raster surface model with one-foot resolution. This DEM acts as the surface upon which all subsequent hydrological modeling was performed. The micro-basin delineation was the result of employing flow direction, flow accumulation, stream channel modeling, and basin modeling in Arc Hydro, the Environmental Systems Research Institute GIS tool for hydrological and water resource analysis. The delineated micro-basins represent a generalization of the output of the GIS analysis, with a number of the modeled lines removed for clarity. The resulting micro-basin delineations (Figure 5) represent “break-lines” that would not likely be crossed by surface flows, thus illustrating the spatial limits (watershed) of potential contributing surface flows for an area. Also derived through hydrological modeling techniques are the flow lines included in the analysis. These lines were derived using the tools in Arc Hydro. The flow lines are not meant to show the location of channelized flow, as might be expected from stream channel modeling in GIS; rather, these lines show the path or direction that water would take from a specific point on a surface. While the flow lines are specific paths that overland flow would follow from a single one foot by one foot location in the study area, they provide a good indication of the general direction and path that flows would follow from a potentially much larger area, until of course they infiltrate into the soil, enter a vernal pool, or channelize, ultimately becoming part of a stream network. Because of the small size and general flat character of the site, channelization is not anticipated to occur on site.

The overall watershed to pool ratio of 9.1:1 is larger than other successful pool complexes and would be sufficient to support the restored vernal pools. Additionally, the project team is comprised of a number of individuals who have been involved in the successful implementation of several vernal pool restoration efforts in San Diego and Riverside counties.



Post-construction Hydrologic Analysis

VERNAL POOL PRESERVE RESTORATION PLAN FOR OTAY BUSINESS PARK

5.3 RESPONSIBLE PARTIES

5.3.1 Project Proponent

Otay Business Park, LLC would be responsible for financing the installation, maintenance, and monitoring of the mitigation measures, including long-term management and monitoring.

5.3.2 Restoration Specialist

Overall supervision of the installation, maintenance, and monitoring of this mitigation project would be the responsibility of a restoration specialist with at least 5 years of vernal pool restoration experience, holding a valid Service permit for identifying fairy shrimp, to be approved by the Service. The restoration specialist will directly oversee all aspects of installation and the minimum 5-year maintenance and monitoring period. The restoration specialist would educate all participants with regard to mitigation goals and requirements and directly oversee grading, excavation, and placement of salvaged topsoil for vernal pool restoration, installation of vernal pool watershed enhancement, artificial owl burrows, focused QCB plantings, and rare plant translocation. In addition, the specialist would conduct all CRAM assessments, other monitoring data collection, and annual assessments, and prepare all required reports. If necessary, the restoration specialist would provide the permittee and contractor with a brief report, including a written list of items in need of attention following each monitoring visit. The contractor would be responsible for carrying out all required measures in a timely manner. The restoration specialist would notify the contractor and responsible party if any requested remediation is not addressed.

5.3.3 Installation/Maintenance Contractor

The installation and maintenance contractor(s) will: have vernal pool habitat restoration experience; be under direction of the restoration specialist; and be responsible for completion of grading, pre-planting weed control, translocation, planting, seeding, and maintenance of the restored and preserved vernal pools and watersheds, and creation and installation of the artificial burrows. The restoration specialist would educate the contractor(s) on the installation and maintenance of vernal pools, native plant species, QCB focused planting areas, and artificial burrows.

After the installation contract is completed, the project proponent(s) would hire a maintenance contractor for the duration of the minimum 5-year monitoring period. The maintenance contractor and the installation contractor may be the same entity. The project proponent may change contractors at its discretion. The maintenance contractor will be educated as to the maintenance of native plant habitat and the difference between native plants and weeds. The maintenance contractor would service the entire restoration area at least once per month. Service would include, but not be limited to, weed control, trash removal, watering, fence repair, dead plant replacement, and re-seeding. If large scale trespassing occurs and the mitigation areas are destroyed by digging or otherwise reconfiguring the pools, mounds, or watersheds for the purposes of off-roading, dirt biking, or other unauthorized use, the mitigation area will be fully restored. All activities conducted would be seasonally appropriate and approved by the restoration specialist. The

maintenance contractor would meet the restoration specialist at the site when requested and would perform all checklist items in a timely manner, as directed by the project proponent.

5.4 RESTORATION IMPLEMENTATION SCHEDULE

5.4.1 Vernal Pool Restoration and Enhancement Implementation Schedule

The schedule for implementation of the mitigation program has not yet been set. Any implementation would only occur if weather and soil conditions are dry enough to conduct the vernal pool restoration without causing irreparable damage to the surrounding habitat. No activities would be conducted within the vernal pools unless approved by the Corps, USFWS, CDFG, and County. In order to obtain this approval, the following conditions must be met:

1. Grading will occur only when the soil is dry to the touch both at the surface and one inch below, and a visual check for color differences (i.e., darker soil indicating moisture) in the soil between the surface and one inch below indicates that the soil is dry.
2. After a rain of greater than 0.2 inch, grading will occur only after the soil surface has dried sufficiently, as described above, and no sooner than 2 days (48 hours) after the rain event ends.
3. Grading would commence only when no rain is forecast during the anticipated grading period.
4. To prevent erosion and siltation from stormwater runoff due to unexpected rains, Best Management Practices (i.e., silt fences and fiber rolls) would be implemented as needed during grading.
5. If rain occurs during grading, work would stop and only resume after soils are dry, as described above.

Initial vernal pool restoration and enhancement activities would include delineating all restoration areas, thatch removal from the entire site, impacting pool inoculum salvage, weed and trash removal, and vernal pool grading. Grading of the restored vernal pools would start once the site has been dethatched. Seeding and planting of the vernal pool enhancement areas would begin after it has been demonstrated that the pools are ponding and no additional contouring is needed. Inoculum will not be introduced into the restored pools until after they have been demonstrated to retain water for the appropriate amount of time to support San Diego fairy shrimp [i.e., at least 30 days (Hathaway and Simovich 1996, Ripley et. al. 2004)]. Inoculum will be placed in a manner that preserves, to the maximum extent possible, the orientation of the fairy shrimp cysts within the surface layer of soil (e.g., collected inoculum will be distributed within the pond so that cysts have the potential to be brought into solution upon inundation). The entire restoration, including pool and upland restoration and site dethatching, is anticipated to be complete within 4 weeks of starting. Pool grading cannot be conducted while the pool soils are wet or damp, so it is expected that pool grading could not be conducted before June or July of a given year. Site dethatching could also only be carried out when soils are dry and capable of

supporting machinery (usually June – November). Monitoring of the restoration effort would begin immediately following installation and will include quantitative hydrological monitoring; vegetation transects; viable cyst, hatched fairy shrimp, and gravid female measurements; complete floral and fauna inventories; and photographic documentation. The monitoring program would continue for a minimum 5-year period and until the success criteria are met and the resource agencies agree with the success of the site. Field surveys would be completed every other week during the rainy season and monthly during the dry season each year with an annual report being prepared and distributed by September 1. The results of the annual reports would be used to determine the success of the restoration effort and to determine any remedial actions necessary. When success criteria are achieved, a site visit will be offered to the resource agencies and a final report would be produced for agency review and approval. A general checklist showing the phases and responsible parties is included in Table 3.

Table 3
VERNAL POOL RESTORATION PLAN CHECKLIST

Construction Phase	Restoration Task	Applicable Parties				
		Project Proponent ¹	Grading Contractor	Installation Contractor	Maintenance Contractor	Restoration Specialist
Pre-construction	Order seed ¹			X		
	Attend pre-construction meeting	X	X	X		X
	Document pre-impact conditions, including a CRAM assessment					X
	Document pre-installation site conditions, including CRAM					X
	Salvage vernal pool topsoil			X		X ²
	Salvage rare plant seed					X
Installation	Delineate mitigation boundaries			X		X ²
	Remove non-native vegetation			X		X ²
	Restore vernal pool topography		X			X ²
	Install container stock and seed and replace vernal pool topsoil			X		X ²
	Conduct post-installation CRAM assessment					X
	Prepare/submit as-built report					X
Five-year Maintenance & Monitoring Period	Conduct maintenance monitoring and annual monitoring; Conduct Year 3 and Year 5 CRAM assessments					X
	Maintain site for remainder of 5 years - until signed off by resource agencies				X	X ²

¹ Must provide all source locations and receive authorization of final seed and plant lists prior to ordering

² Inspecting or overseeing work related to this task

5.4.2 Artificial Burrow Implementation Schedule

Implementation of the burrowing owl mitigation program will occur before any site grading is conducted provided that weather and soil conditions are dry enough to conduct the artificial burrow installation without causing irreparable damage to the mima mounds.

5.4.3 QCB Focused Planting Implementation schedule

Preparation of the QCB focused planting areas will occur concurrently with the vernal pool grading. Seeding of the QCB focused planting areas will occur in the late fall/early winter, concurrent with the seeding of the vernal pool restoration area.

5.4.4 Rare Plant Translocation Schedule

Variegated dudleya and San Diego barrel cactus would be salvaged before any project site grading occurs. Variegated dudleya salvage will occur in the fall, after the plants have gone dormant. Chocolate lily, spreading navarettia seed would be collected in the spring. San Diego button-celery seed would ideally be collected in July/August, as these are the most likely times of year for seed to still be on the plant. Efforts would be made to reduce the time between salvage and installation.

5.5 RESTORATION SITE PREPARATION

Site preparation would be accomplished by dethatching the non-native grasslands in the Lonestar Parcels, salvaging rare plants and seed in the proposed project site and seed on the mitigation site, grading restored vernal pools, compacting and preparing QCB focused planting areas, and protecting the restoration area from intrusion.

5.5.1 Initial Dethatching

The presence of a dense thatch of non-native grasses at this site impairs the emergence of native broadleaf species. Accumulation of years worth of dead grass stems (primarily wild oats [*Avena fatua*]) prevents the establishment and growth of native species throughout the site, including the pools and uplands. It is expected that the removal of grass thatch from the site will allow for the emergence of native species from the extant seed bank. All non-native grassland areas within the entirety of the Lonestar Parcels would be dethatched before any other restoration activities occur. Dethatching consists of mowing or weed-whipping standing grass stalks, and raking, collecting, and removing the grass straw and other cut weeds from the site. All cuttings and thatch would be disposed of in a legal manner. Prior to dethatching, areas supporting native plants would be flagged for avoidance.

5.5.2 Vernal Pool Inoculum Salvage

Restoration of the native vernal pool habitat on site requires the reintroduction of plants and animals, in addition to the physical construction described above. Partly because vernal pools recur reliably in the same location year after year, many vernal pool species are adapted for a

strategy of non-dispersal (Zedler 1990). As a result, the restoration of vernal pool habitat can be greatly accelerated by the active transport of propagules from donor sites into the restored pools (Scheidlinger et al. 1985). While only a small amount of vernal pool vegetation was observed in the existing pools on site, it is likely that vernal pool plant seed, spores, bulbs, cysts, and other propagules are present in the soil.

Prior to project site development, vernal pool topsoil would be collected, placed into boxes, and stored until the restoration site is ready. Hand tools (i.e., shovels and trowels and/or light machinery) would be used to remove the first one to 2 inches of soil from the existing pools. Soil would be placed in boxes of sturdy, moving grade cardboard, with lids. Typically the size of each box is 12 inches x 15 inches x 10 inches (depth). Butcher paper (or similar) will be placed in the bottom of the boxes to reduce leaks. Boxes should only be filled to 3/4 of capacity or approximately 3/4 cubic feet each, to allow for safe movement. The collected inoculum from each pool would be labeled and kept separate from inoculum collected from other pools. The amount of inoculum collected from a given pool depends upon its size, slopes, and quality. Each box must be labeled with the pool number, box number, and date of collection. Boxes would be moved to a secure, dry, enclosed storage facility. Boxes should be stored off the floor, on pallets or similar.

It is expected that topsoil salvage from the large pool on the east side of the site will include seeds of San Diego button-celery, spreading navarretia, and a considerable amount of weed seeds. Any restoration basin that receives topsoil from this basin would be closely observed for the emergence of Italian ryegrass (*Lolium multiflorum*).

Off-site inoculum would be required to supplement the salvaged soils to achieve reasonable vernal pool cover because of the low quality of the impacted pools. Potential sources of inoculum include other vernal pool restoration projects that have been conducted by HELIX on Otay Mesa, including the Caltrans SR-125 mitigation site, Robinhood Ridge Vernal Pool Preserve, Sweetwater Unified High School District Restoration Site, Cal Terraces, and Arnie's Point Vernal Pool Preserve. These locations provide a large surface area of pools, with a variety of vernal pool indicator plant species. Care would be taken to minimize the introduction of weed seeds into the restored vernal pools. Prior to the use of off-site inoculum, the restoration specialist would contact the appropriate resource agencies (Corps, USFWS, and CDFG) for approval. Inoculum will be collected in limited quantity, coordinated with the Service, from source pools, such that no appreciable damage occurs to source pools. No more than 10 percent of the basin area of any donor pool will be used for collection of inoculum.

5.5.3 Rare Plant and Seed Salvage

Variegated Dudleya

The large patches of variegated dudleya exist on the eastern side of the hill on the south edge of the project site. Seed and corms of these plants would be collected. Seed collection would be conducted by the restoration specialist or a qualified seed collector in June, and would attempt to collect as much seed as possible. Seed would be stored in a cool, dry,

dark, well ventilated location in paper bags until they can be placed in the receptor site. The seed collector would also gather seed of any chocolate lily observed.

Variegated dudleya would be salvaged and transplanted to receptor sites within the vernal pool restoration area (Figure 4) in the summer/fall when the plants are dormant. At this time of year the above ground portion of the plant has died off, leaving an underground corm to resprout in the following winter/spring season. Salvage of the corms will be accomplished by collecting large chunks of soil several inches deep and approximately one foot in diameter from the impacted population areas. The corm containing soil chunks will be carefully removed with hand tools so that the corms and topsoil remain undamaged. By collecting and transplanting chunks of soil, instead of digging up individual corms, the corms will remain at their original depth and position in the soil. In addition, the chunks contain corms, bulbs, seed, and propagules of other desirable native species. Following collection, the soil clumps will be placed in nursery flats and carefully transported to the receptor site for transplantation.

San Diego Barrel Cactus

When salvaging the San Diego barrel cactus, the contractor will mark the south side of the cactus with a small amount of paint. The main taproot should be trimmed to approximately 6 inches, laid in shade, and kept dry for a week to allow the root to callus over. Roots may also be dusted with sulfur at time of removal to prevent rot. Plants should be kept in a holding bed or pot, of native soil mixed with sand. When the cactus is installed at the planting site, the cactus should be oriented with the marked side facing south, to prevent sun damage to the plant. Cactus should ideally not be held for more than 6 months, to prevent the cactus from rooting at the holding site.

San Diego Button Celery and Spreading Navaretia

Introduction of San Diego button celery and spreading navaretia into the restored pools will be coordinated with the Service. Spreading navaretia seed obtained for restoration purposes will be collected using the below guidelines: No more than 5 percent of the projected annual seed production of any individual plant or discrete population of plants should be collected; collections will be made in such a manner to capture the majority of the genetic variation found in the sampled populations; and the seed will be collected from the site closest to the habitat restoration/creation site where access can be obtained.

5.5.4 Vernal Pool Grading

The restored pools (Figures 3 and 4) would be formed to replicate hydrologic conditions of existing vernal pool habitat in Otay Mesa. A post-construction hydrologic analysis depicts the vernal pool restoration area and its watershed following project implementation and vernal pool restoration (Figure 5). Pools would be graded to have maximum depths of 4 to 6 inches for San Diego fairy shrimp pools and 12-24 inches for Riverside fairy shrimp pools, with the goal of having appropriate ponding for these species. Pools are planned to have slopes of 12:1 to 15:1 to provide smooth, micro-topographic variance for vernal pool plants. Material removed during pool excavation would be used to enhance and restore existing disturbed mima mounds. All restored pools would be created and inoculated with appropriate vernal pool flora and fauna.

Vernal pool grading would be carried out under the supervision of the restoration specialist. The restoration specialist would mark all areas to be graded. Existing sensitive habitats and plants would be marked as avoidance areas. Access routes would be identified and marked. No access would occur through the adjacent Caltrans preserve. An on-site meeting would be held with the restoration specialist and all installation personnel to identify sensitive areas and devise a strategy for avoidance prior to initiation of restoration activities. A staging area would be established outside of the on-site vernal pool restoration area. Grading shall be implemented using rubber-tired loaders with ripping tines and slope boards. Skid-steer loaders would not be used because of their high impact on soil. All vehicles and construction equipment would be restricted to the staging areas when not required for restoration activities.

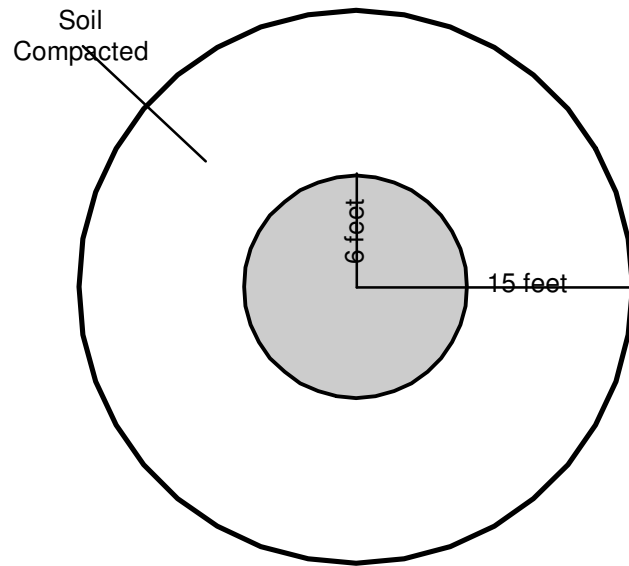
5.5.5 QCB Habitat Focused Planting Area Compaction

While compact, undisturbed clay soils may support habitat suitable for QCB, disturbed native topsoils are subject to high rates of colonization by non-native grasses and other tenacious weeds. QCB habitat focused planting areas are designed to have compact soils that retard the invasion of weeds and allow for QCB basking areas, and are heavily seeded to have large amounts of QCB host and nectar plants. These areas are intended to provide immediate QCB habitat while the other enhancement and restoration activities are expected to take 5 or more years to become fully established. Over time the focused QCB areas may revert to non-native grassland, similar to the surrounding habitat. It is anticipated that the need for the focused QCB areas in the future will be lessened with the successful completion of the adjacent enhancement and restoration effort,

Six focused QCB habitat focused planting areas would be constructed in the vernal pool restoration area (Figure 6). Each QCB habitat area would be 30 feet in diameter (707 square feet) and would be centered on a mima mound. Construction would involve removing all weed material, ripping the soil surface, importing decomposed granite, spreading the gravel over the planting area, and compacting it into the soil surface. Soil would be ripped to a depth of 4-inches with ripping tines mounted to a tractor. Approximately one cubic yard of decomposed granite would be imported per area (6 yd³ total). The granite gravel would be spread over each QCB area and compacted into the soil by driving a wheeled or tracked tractor over it.

HELIX constructed 6 of these focused planting areas for the Redhawk mitigation site in the City of Murrieta, California. The Redhawk mitigation site experienced similar levels of grazing and non-native grass invasion as the Lonestar Parcels. At the end of the fourth year of monitoring program, the focused planting areas remained low in weed cover and had high cover of QCB host plants (HELIX 2006). Over time non-native grassland has encroached into the QCB areas; however, the adjacent restored sage scrub has become more established with QCB host plants as a recurring component and therefore the need for the focused QCB areas is lessened. Similar success with this procedure is anticipated at this location.

Planting Diagram for Each Focused Quino Checkerspot Butterfly Seeding Area (6 Total)



Center Circle

2 Lbs Dot-seed plantain (*Plantago erecta*) - Quino host plant

Outer Circle

0.2 Lb Coulter's snapdragon (*Antirrhinum coulterianum*) - Quino host plant

0.4 Lb Rancher's fiddleneck (*Amsinckia menziesii* var. *intermedia*) - Quino nectar resource

0.2 Lb Purple owl's clover (*Castilleja exserta* ssp. *exserta*) - Quino host plant

0.2 Lb Chinese houses (*Collinsia heterophylla*) - Quino host plant

0.2 Lb Nievitas cryptantha (*Cyrtanthera intermedia*) - Quino nectar resource

0.4 Lb Common goldfields (*Lasthenia gracilis* (L. *californica*)) - Quino nectar resource

0.2 Lb Ground Pink (*Linanthus dianthiflorus*) - Quino nectar resource

3 Lbs Dot-seed plantain (*Plantago erecta*) - Quino host plant

E:\ArcGIS\PGN-01 Armaiz\Map\BIO\VP Restoration\Fig7_QCB_Seeding.mxd -NM

Focused Quino Checkerspot Butterfly Habitat Seeding Area Diagram

VERNAL POOL PRESERVE RESTORATION PLAN FOR OTAY BUSINESS PARK

5.5.6 Fencing and Signage

A temporary, non-barbed, 3-wire fence would be constructed around the boundary of the 4.7-acre vernal pool restoration area to delineate this area for maintenance activities, and would tie into the existing fence along the adjacent preserve.

Aluminum signs would be posted adjacent to the dirt road on the north and south boundary of the site, providing notice in both English and Spanish that the area is an ecological preserve and that trespassing is prohibited.

5.6 ARTIFICIAL BURROW INSTALLATION

Thirty-five artificial burrows would be constructed of man-made materials and installed on the Lonestar Parcels. The burrow locations would be situated on mima mounds to ensure a slightly higher vantage point on the surrounding area. The area immediately adjacent to the artificial burrows would be cleared of vegetation, compacted, and covered with several mid-size rocks to discourage the establishment of tall vegetation.

The artificial owl burrow design (Figure 7) is based on plans described in the CDFG staff recommendations (CDFG 1995) and in Barclay (2008). Each artificial owl burrow would consist of a nest chamber and 2 entrance/exits. An irrigation valve box is used as the nest chamber and would be placed at least a foot underground. The valve box would be covered by chicken wire mesh fencing to discourage predation. Bricks would be placed below each box, with 3 to 4 inches of soil on top of the bricks, to create a dirt floor within the chamber. The 2 entrance/exits would be created using 4-inch corrugated black drain pipes. Each pipe would have a 90 degree bend to keep light out of the nesting chamber. The pipes will be installed at a slight downward angle to prohibit water flow into the nesting chamber. To prevent animals from digging into the burrows, chicken wire would be placed on top of the chamber and the pipes and then would be buried with soil. The ends of the pipes would pass through square cinder blocks to help prevent the pipes being dug up or crushed. A stake/post would be provided adjacent to each artificial burrow to provide a perch. Any rocks unearthed during burrow construction would be piled on the soil surface above the nest box. A native seed mix would be applied to any soil disturbed during the creation of the artificial owl burrows (Table 4). This mix includes QCB host and nectar plant species to help improve the overall habitat for this species.

Table 4
ARTIFICIAL OWL BURROW HABITAT SEED MIX

Scientific Name	Common Name	Pound/Acre	Amount to be Ordered*
<i>Calochortus splendens</i>	splendid mariposa lily	1	0.5
<i>Castilleja exserta</i> ssp. <i>exserta</i>	purple owl's clover	2	1
<i>Cryptantha intermedia</i>	nievitas cryptantha	1	0.5
<i>Eschscholzia californica</i>	California poppy	2	1

Table 4 (cont.) ARTIFICIAL OWL BURROW HABITAT SEED MIX			
Scientific Name	Common Name	Pound/Acre	Amount to be Ordered*
<i>Lasthenia gracilis</i> (<i>L. californica</i>)	common goldfields	3	1.5
<i>Lepidium nitidum</i>	shining peppergrass	2	1
<i>Nassella pulchra</i>	purple needlegrass	4	2
<i>Plantago erecta</i>	dot-seed plantain	2	1
<i>Sisyrinchium bellum</i>	blue-eyed grass	2	1
TOTAL		19	9.5

*Based on one-half acre

5.7 VERNAL POOL RESTORATION AREA PLANTING PLAN/ INSTALLATION

5.7.1 Vernal Pool Inoculation

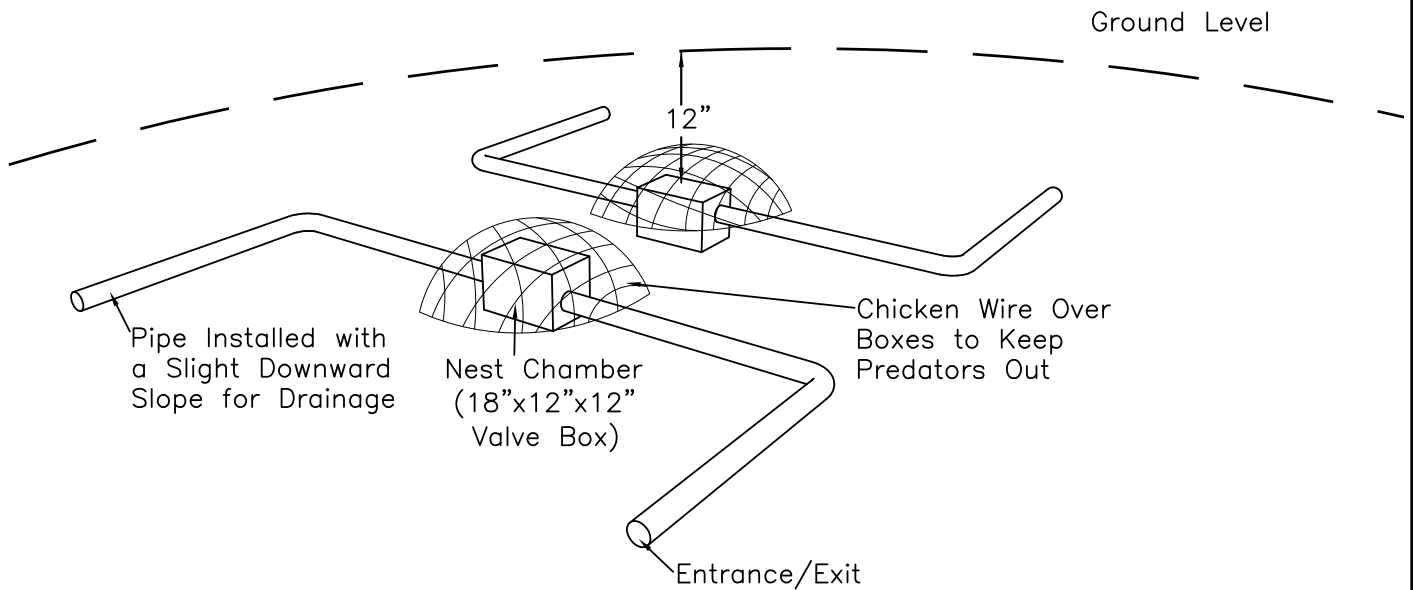
After the pools are successfully graded and have demonstrated adequate ponding, each of the restored pools would receive a share of the total collected pool material proportionate to its surface area. The collected soils would be spread out and raked into the bottoms of the restored pools.

5.7.2 Vernal Pool Restoration Area Planting Plan

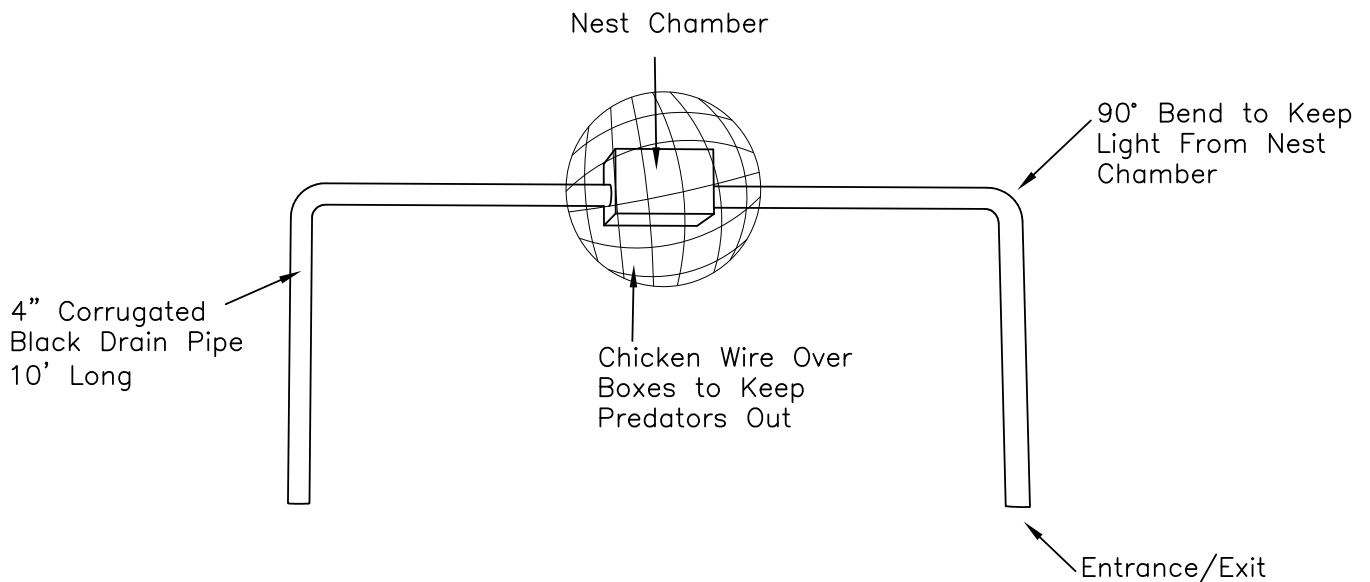
Restoration of upland habitat is critical to the overall success of this vernal pool restoration plan. Without native vegetative cover to prevent erosion, the pools may fill with materials washed in from the adjacent upland areas or become overrun by annual grass weeds. All vernal pool restoration will occur within a 4.70-acre portion of the site. Uplands in this restoration area will be restored to either native grassland or Diegan coastal sage scrub. Upland restoration will involve a number of techniques including installing: (1) salvaged rare plants from the Otay Business Park site, (2) container stock plantings, and (3) commercially obtained seed mix. No seeding or planting will occur within restored pools (besides salvaged inoculum).

Native grassland restoration will occur in 0.38 acre of the vernal pool uplands. The remainder of the upland restoration will consist of the addition of supplemental Diegan coastal sage scrub species. The planting palette for the native grassland is presented in Table 5. All grass plantings would be 2-inch “square-liner” plugs. The native grassland seed mix is presented in Table 6. The seed mix is dominated by native bunchgrasses, with additional forb and shrub species. All seed will be broadcast by hand. To take advantage of the rainy season and minimize seed predation, all seeding will occur between November 15 and January 15.

Artificial Burrowing Owl Burrows Side View



Artificial Burrowing Owl Burrows Top View



E:\ArcGIS\PGN-01 Armaiz\Map\BIO\VP Restoration\Fig6_ArtificialOwlBurrows.indd -NM

Artificial Burrowing Owl Burrows

VERNAL POOL PRESERVE RESTORATION PLAN FOR OTAY BUSINESS PARK

Table 5 NATIVE GRASSLAND PLANT PALETTE			
Scientific Name	Common Name	Number per Acre	Number to be Ordered*
<i>Nassella lepida</i>	valley needlegrass	500	190
<i>Nassella pulchra</i>	purple needlegrass	1500	570
TOTAL		2000	760

*Based on 0.38 acre

Table 6 NATIVE GRASSLAND SEED MIX			
Scientific Name	Common Name	Pounds per Acre	Amount to be Ordered*
<i>Achillea millefolium</i>	yarrow	1	0.38
<i>Aristida purpurea</i>	purple three-awn	1	0.38
<i>Artemisia californica</i>	coastal sagebrush	2	0.76
<i>Eriophyllum confertiflorum</i>	golden yarrow	2	0.76
<i>Eriogonum fasciculatum</i>	California buckwheat	3	1.14
<i>Lupinus bicolor</i>	bicolor lupine	1	0.38
<i>Melica imperfecta</i>	oniongrass	1	0.38
<i>Nassella lepida</i>	valley needlegrass	2	0.76
<i>Nassella pulchra</i>	purple needlegrass	5	1.9
<i>Sisyrinchium bellum</i>	blue-eyed grass	1	0.38
<i>Viguiera laciniata</i>	San Diego sunflower	1	0.38
TOTAL		20	7.60

*Based on 0.38 acre

The Diegan coastal sage scrub container stock plant palette is included in Table 7. The amount of container stock for each species is dependent upon availability from local nurseries. All of the species in the planting and seeding palettes have been observed either on the Lonestar parcels or on south facing slopes in the vicinity of Otay Mesa. All sage scrub plantings would be one-gallon pots. Root bound container stock would not be accepted from the nursery. Container stock placement would be overseen by the restoration specialist, and plants would be positioned prior to planting. Planting holes should be excavated to 1.5 times the planting depth, to loosen the soil. Prior to installing container stock, the planting hole would be filled with water and allowed to drain, to build soil moisture. Container stock should be planted so that after soil settling, the crown of the root ball is one-inch above finish grade. The holes should be backfilled around the container stock with native soil, and the holes would be watered immediately after planting, to settle the soil. Any voids or settlement should be filled with additional native soil, and the watering repeated.

Table 7 DIEGAN COASTAL SAGE SCRUB CONTAINER STOCK PLANT PALETTE			
Scientific Name	Common Name	Number per Acre	Number to be Ordered*
<i>Adolphia californica</i>	spineshrub	40	132
<i>Ambrosia chenopodiifolia</i>	San Diego bur-sage	20	66
<i>Artemisia californica</i>	coastal sagebrush	150	495
<i>Brickellia californica</i>	California bricklebrush	20	66
<i>Cylindropuntia californica</i> var. <i>californica</i>	snake cholla	20	66
<i>Cylindropuntia prolifera</i>	coast cholla	N/A	100†
<i>Eriogonum fasciculatum</i>	California buckwheat	200	660
<i>Ferocactus viridescens</i>	San Diego barrel cactus	20	66
<i>Malacothamnus fasciculatus</i>	bush mallow	20	66
<i>Mirabilis laevis</i>	wishbone bush	20	66
<i>Opuntia littoralis</i>	coast prickly-pear	N/A	100†
<i>Viguiera laciniata</i>	San Diego sunflower	200	660
TOTAL		710	2,543

*Based on 3.3 acres

†For use in coastal cactus wren planting areas, away from owl burrows

The seed mix for the upland restoration area is presented in Table 8. This palette includes a mix of shrub, forb, and native bunchgrass species. To take advantage of the rainy season and minimize seed predation, all seeding will occur between November 15 and January 15.

Table 8 DIEGAN COASTAL SAGE SCRUB SEED MIX		
Scientific Name	Common Name	Amount (lbs) to be Ordered*
<i>Achillea millefolium</i>	yarrow	4
<i>Artemisia californica</i>	California sage brush	12
<i>Bloomeria crocea</i>	common golden star	4
<i>Convolvulus simulans</i>	small-flower morning glory	2
<i>Corethrogyne filaginifolia</i> var. <i>filaginifolia</i>	common sand-aster	4
<i>Dichelostemma capitatum</i>	blue dicks	4
<i>Dodecatheon clevelandii</i> †	shooting stars	4
<i>Eriogonum fasciculatum</i>	California buckwheat	20
<i>Eriophyllum confertiflorum</i>	golden yarrow	8
<i>Eschscholzia californica</i>	California poppy	4
<i>Lotus scoparius</i>	deerweed	12
<i>Nassella pulchra</i>	purple needlegrass	16

Table 8 (cont.) DIEGAN COASTAL SAGE SCRUB SEED MIX		
Scientific Name	Common Name	Amount to be Ordered*
<i>Penstemon spectabilis</i>	showy penstemon	2
<i>Plantago erecta</i>	dot-seed plantain	8
<i>Sisyrinchium bellum</i>	blue-eyed grass	8
<i>Viguiera laciniata</i>	San Diego sunflower	16
TOTAL		128

*Based on 3.8 acres

‡These species will be kept separate from the rest of the seed order, and applied on the north facing sides of existing mima mounds

5.7.3 QCB Focused Planting Area Planting Plan

QCB habitat focused planting areas will be hand-seeded with a mix of larval host plants and potential nectaring resource flowers at the beginning of the rainy season (Table 9). The inner area, in a 6-foot radius from the center of the planting area, will be seeded with a high concentration of dot-seed plantain, a main QCB larval host plant. An outer ring, consisting of the area from 6 through 15 feet from the center of the circle, will be seeded with a mix of QCB larval and host plants (Figure 6).

Table 9 QCB HABITAT FOCUSED PLANTING AREA SEED MIX			
Scientific Name	Common Name	Pound/ Area†	Pounds to be Ordered
Center Seeding Area			
<i>Plantago erecta</i>	dot-seed plantain	2.0	12.0*
Outer Seeding Area			
<i>Amsinckia menziesii</i> var. <i>intermedia</i>	rancher's fiddleneck	0.4	2.4
<i>Castilleja exserta</i> ssp. <i>exserta</i>	purple owl's clover	0.2	1.2
<i>Cryptantha intermedia</i>	nievitas cryptantha	0.4	2.4
<i>Lasthenia gracilis</i> (<i>L. californica</i>)	common goldfields	0.4	2.4
<i>Linanthus dianthiflorus</i>	ground pink	0.4	2.4
<i>Plantago erecta</i> **	dot-seed plantain	3.0	18.0
TOTAL		6.8	40.8*

†Seeding rates are dependent on availability of seed material

*Center circle seed to be kept separate from rest of order

** Preferred source from more prostrate, non-fuzzy populations on Otay Mesa

Flat-top buckwheat (*Eriogonum fasciculatum*) shrubs (Table 7) will be installed around the perimeter of each focused QCB habitat focused planting area to provide needed shrub cover for any QCB utilizing the area. Some of the cobble expected to be uncovered during vernal pool grading and container stock planting would be placed in the QCB habitat focused planting areas to provide basking perches for QCB.

5.7.4 Rare Plant Translocation

The receptor sites for the variegated dudleya are located in mima mounds adjacent to vernal pools near areas supporting existing variegated dudleya populations. Soil at the receptor sites will be loosened to a depth of approximately 4 inches prior to planting with the collected soil clumps. The soil clumps will be hand “tiled” in the ripped area in much the same way kitchen tiles are fitted on to a counter top. Each clump will be carefully placed in the soil such that the surface of the clump is level with the surrounding ground level and there are no spaces between adjacent clumps. Careful placement and fitting will continue until all of the clumps have been planted. At this time, the entire area will be watered to help the clumps settle into place. Native topsoil will be used to fill in any gaps that open up after watering. Collected variegated dudleya seed will be applied to the vicinity of the dudleya clumps at the beginning of the rainy season. Once the clump fitting and site seeding is complete, the entire area will be marked, staked, and flagged to preclude accidental entry and to identify the area in the future.

Salvaged San Diego barrel cactus will be planted in groups throughout the vernal pool restoration area. Groupings will consist of at least 5 plants. The cactus will be aligned with the previously applied mark pointing south. Metal plant tags will be installed in the soil near transplanted San Diego barrel cactus, so that the transplanted individuals can be differentiated from the container stock plantings after the paint markings fade.

5.8 IRRIGATION PLAN

No broadcast irrigation is planned or considered appropriate for this project. Runoff from any spray irrigation could alter the hydrology or water chemistry of the surrounding vernal pools. Irrigation runoff entering pools could cause vernal pool plant seed germination or fairy shrimp cysts to leave diapause at a time of year not appropriate, and therefore cause the death of these individuals.

Any artificial watering of the restored pool watersheds will be done in a manner that prevents water from entering into the pools. Any water to be used will be identified and documented to be free of contaminants that could harm the pools.

Container stock and grass plugs will be watered in at the time of planting, and then periodically during the installation and maintenance period. A water truck will be brought to the site, and water will be moved to the container stock by hose or watering can. The water truck will remain on designated roads, and will not enter the restoration sites. Each planting will be individually watered by hand, in a way such that run-off from the planting does not occur. During installation, the entire planting hole will be watered, but afterwards, only the deep pipe will be watered. During each watering visit, each deep pipe will be filled, allowed to naturally drain, and then filled again.

5.9 WILDLIFE HABITAT ENHANCEMENT

In addition to seeding and planting, the restoration effort will include additional measures intended to increase the potential for wildlife usage of the site, particularly in the early years prior to full establishment.

5.9.1 Small Animal Cover

In order to encourage wildlife establishment and use of the restoration area, and document small animal presence, shelter for small mammal and reptile species will be created on site. These shelters include placement of 20 half-inch thick plywood boards, measuring 2 by 4 feet, within the site. These boards will provide shade, cover, and nesting locations for species including mice, lizards, snakes, and numerous invertebrate species (insects, spiders, etc.). The boards also provide an opportunity to monitor the wildlife usage of the site. During regular monitoring visits, the project biologist will be able to lift each board and note the species present.

Additionally, the sparse shrubs on the hill on the southern side of the Otay Business Park will be collected and used for brush piles within the Otay Business Park Mitigation site. Shrubs will be collected by hand before site grading, transferred to the restoration site, and stacked into low brush piles to provide additional cover for small animals.

5.9.2 Pollinator Support

Pollinator species are integral in a diverse, self sustaining habitat. Pollinators may include bats, birds, and a host of insects. The restoration seed mixes include a variety of forbs and other plants with overlapping flowering periods to support a wide-range of pollinators that will stimulate continued seed production and provide pollen and nectar sources for foraging wildlife. In addition, 20 bee blocks will be prepared and scattered throughout the Lonestar Parcels to provide nesting locations for native wood and cavity-nesting bees. Bee species from the Apidae, Colletidae, Halictidae, and Megachilidae families are expected. The bee blocks will consist of an untreated 4 inch by 8 inch by 12 inch block of wood. Numerous holes ranging in size from 3/32 inch to 3/8 inch in diameter will be drilled approximately 3/4 inch on center on the 4-inch wide face of the block. The hole depths will be approximately 3 to 4 inches for holes less than 1/4 inch in diameter and 5 to 6 inches for holes greater than 1/4 inch in diameter. The varying hole sizes and depths should attract a variety of native solitary bee species. The bee blocks will be positioned such that they face the morning sun (east to southeast).

The restoration effort also will include support for ground-nesting bees in the form of small, shallow sand pits (Sarver 2007). A total of 12 sand pits will be installed within the Lonestar parcel, with at least 4 of those within the vernal pool restoration area. Each pit will be approximately 2 feet deep and 4 feet in diameter. The pits will be filled with a mix of sand, native soil, and organic material (plant chippings). In addition to ground nesting bees, several other insect species may use these pits as foraging and nesting areas. Birds also may use the pits for taking dust baths for feather maintenance, parasite control, and temperature regulation.

5.9.3 Cactus Wren Habitat

Populations of coastal cactus wrens have dramatically decreased over recent years due to habitat loss resulting from wildfires and development. Coastal cactus wren is a California Species of Special Concern and is known to inhabit communities of coastal sage scrub that contain substantial clusters of cactus species. The species nests almost exclusively in cholla and prickly pear species. Coastal cactus wren was observed in nearby Johnson Canyon in 2010 by HELIX biologists. Prickly pear (*Opuntia littoralis*) and coast cholla (*Cylindropuntia prolifera*) container stock will be planted in thick patches within the restoration area to provide habitat suitable for cactus wren nesting (Table 7). Patches will contain at least 20 plantings. Cholla will not be planted in the vicinity of artificial owl burrows to reduce the possibility of desert woodrat (*Neotoma lepida*) from using the artificial burrows in conjunction with these cacti.

5.9.4 San Diego Fairy Shrimp

The majority of the Lonestar mitigation site is within designated Critical Habitat for the San Diego fairy shrimp. The habitat restoration effort is intended to improve the quality of the habitat for this, and other vernal pool associated species, through vernal pool habitat restoration and enhancement of the primary constituent elements (PCEs) of San Diego fairy shrimp habitat. PCEs for this species include:

1. Vernal pools with shallow to moderate depths (2 in [5 cm] to 12 in [30 cm]) that hold water for sufficient lengths of time (7 to 60 days) necessary for incubation, maturation, and reproduction of the San Diego fairy shrimp, in all but the driest years;
2. Topographic features characterized by mounds, swales, and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described in PCE 1, providing for dispersal and promoting hydro periods of adequate length in the pools (i.e., the vernal pool watershed); and
3. Flat to gently sloping topography, and any soil type with a clay component and/or an impermeable surface or subsurface layer known to support vernal pool habitat (including Carlsbad, Chesterton, Diablo, Huerhuero, Linne, Olivenhain, Placentia, Redding, and Stockpen soils).

All of these PCEs occur within the restoration site. The habitat restoration activities proposed in this plan will improve and increase the presence of PCEs no. 1 and 2 noted above. Specifically, the project will increase the amount of vernal pools supporting San Diego fairy shrimp on site from 2 pools (0.01 acre) to as many as 50 restored pools (0.36 acre), a 3,600 percent increase in known occupied pool area for the Lonestar CH subunit. Additionally, the mowing of grasses and thatch removal across the site (refer to Section 5.5.1), and within the preserved vernal pools, will improve the quality of the existing vernal pool and San Diego fairy shrimp habitat on site. Over the past several years, since the removal of cattle on the site, non-native grasses (primarily *Avena* spp. and *Lolium multiflorum*) have steadily taken hold within the pools, altering their hydrological characteristics and reducing their ability to pond water long enough and deep enough for San Diego fairy shrimp populations to persist. Mowing and thatch removal is

expected to result in increased capacity for a total of 80 existing pools to support fairy shrimp over time by decreasing the amount of non-native grasses that occur within and adjacent to the pools. By reducing the amount of grasses from within and adjacent to the pools, it is anticipated that their water holding characteristics will improve (increased duration and depth), which should result in better fairy shrimp habitat.

5.10 HABITAT AND ARTIFICIAL BURROW AS-BUILT CONDITIONS

The restoration specialist shall submit to the County, Corps, CDFG, and USFWS, within 6 weeks of completion of site preparation and planting, a map showing the as-built conditions of the vernal pool mitigation areas. Areas of grading and seeding shall be shown on the map. The restoration specialist shall submit to the County, USFWS, and CDFG within 6 weeks of completion of installation of artificial burrows and planting, a map showing the as-built conditions of the artificial burrows.

6.0 MAINTENANCE PLAN

6.1 HABITAT MAINTENANCE ACTIVITIES

A 5-year maintenance program is proposed to ensure the successful establishment and persistence of the restored habitat. The maintenance program would involve removal of trash, weed control, fence repair, and any remedial measures deemed necessary for restoration program success (e.g., re-seeding and re-contouring). Long-term management would be conducted according to the Resource Management Plan for Otay Business Park Off-Site Biological Open Space at Lonestar Ridge (HELIX 2011b).

6.1.1 Trash Removal

The maintenance contractor would remove any trash encountered within the Lonestar Parcels during every maintenance event and dispose of it in a legally acceptable fashion.

6.1.2 Weed Control

Vernal Pool Restoration Area

Particular maintenance emphasis in the vernal pool restoration area will be placed on pro-active weed control. All weed species observed within the vernal pool restoration area during restoration activities would be considered invasive and targeted for removal. All workers conducting weed removal activities would be educated to distinguish between native and non-native species, with special attention paid to rare and endangered plant species. All weeding within the restored pools would be performed by hand and with hand tools. Care would be taken within pools to avoid removing vernal pool plant species and to reduce soil disturbance. Weeds would be removed from the restoration limits and disposed of in a legal manner. All weeds would be removed prior to reaching 12 inches in height or before reaching seed. Leaf and branch drop of native species should be left in place and not removed from the site.

Weeds in the uplands of the vernal pool restoration area will be removed by hand tools whenever possible, but focused herbicide application could be used if needed and requested by the vernal pool restoration specialist. Pesticides would only be applied by workers licensed to use those chemicals.

Additionally, no herbicide will be used within 5 feet of any vernal pools. Herbicides will not be used during wet or windy conditions. Care will be taken not to saturate the soils with herbicide, and any herbicide used will not be allowed to be blown into pools.

In an effort to reduce damage to small annual plants and to avoid walking on QCB larval host plants (e.g. dot-seed plantain and purple owl's clover [*Castilleja exserta*]), care will be taken in the QCB habitat focused planting area.

Mechanical removal of weed species with a line trimmer or other such device in the upland areas also may be necessary. However, no mechanical weed removal devices will be used in any pool. Weeding will not occur in inundated sections of the pools. Pools may be recontoured if necessary to increase the hydrologic ponding period, which helps exclude upland weed species.

As the southern california region is already polluted with nitrogen deposition, no fertilizers will be used in the restoration site.

Vernal Pool Watershed Enhancement Area

The entire non-native grassland area of the Lonestar Parcels would be dethatched during initial site preparation and additional times during the maintenance period. Additional mechanical or chemical control of weeds within the entire non-native grassland area will occur in February of each year of the 5-year monitoring period. Weeding must be completed by the maintenance contractor in February, before annual grasses go to seed, to reduce the seedbank of these weeds and prevent the formation of new straw thatch. Conducting grass removal during this time also will help to avoid inadvertently removing native annual species that emerge and flower in the spring. In addition, the restoration specialist will flag avoidance areas to help maintenance crews avoid native species.

6.1.3 Artificial Burrow Maintenance

Maintenance personnel shall be educated as to the sensitivity of burrowing owls and the goals of the artificial burrow maintenance program. Maintenance tasks shall be performed only at the direction of the specialist for a 5-year period following burrow construction. Sites have been selected and designed to ensure that the need for maintenance would decrease each of the 5 years. The specialist may direct maintenance personnel to avoid burrows by providing a minimum 50-meter (m), non-maintenance buffer should owls occupy burrows.

Maintenance tasks could include vegetation management around each burrow, repair of burrows damaged by vandalism, and installation of signs prohibiting trespassing in sensitive habitat areas (i.e., where burrows are located).

Vegetation management could include mowing or weed-whipping a 50-foot radius around each burrow, although the burrow locations have been designed with gravel placement, soil compaction, and seeding with low-growing plant species to limit the need for this type of maintenance. Vegetation management could also include reseeding around the burrows with the low-growing plant species listed earlier in this document, or other species, if deemed necessary by the specialist. Damage to burrows could be caused accidentally (such as by maintenance equipment or humans trespassing) or by vandalism. Damage could include collapse or blockage of burrow entrances or vegetation alteration around burrows. Damaged burrows and vegetation surrounding the burrows should be repaired to their pre-damaged condition within one week of the damage being observed. In a worst-case scenario, damage repair could include reconstructing part of a burrow, recompacting soil, and reseeding. The burrows would be designed and installed to limit the potential risk of collapse by making use of heavy materials and extending the burrow entrances well beyond the soil horizon.

The restoration specialist will be periodically inspecting the artificial burrows for presence of burrowing owls (See section 8.1.3). If owls are observed, the restoration specialist will determine if maintenance adjacent to the burrows can be avoided. Maintenance adjacent to burrows will only be a priority in February to March, when exotic plants tend to exhibit the most growth. Maintenance in the vicinity of active burrows will be avoided during the burrowing owl breeding season (April 15 through July 15). The restoration specialist will provide a labeled map to the maintenance personnel showing the location of any avoidance areas.

6.1.4 Container Stock Irrigation

Container stock, native grass plugs, and transplanted sensitive plants will be hand watered at least twice a month, if necessary, during the first 2 years of maintenance and monitoring. Hand watering may not be necessary during the rainy months. Water will be applied in such a way that run off does not occur.

Dead container stock will be replaced by the maintenance contractor at the request of the vernal pool restoration specialist, if container stock are not meeting survival goals.

6.1.5 Fence Repair

The 3-strand barbless wire fence will be maintained in good order by the maintenance contractor. The maintenance of the existing chain-link fence bordering SR-125 is not the responsibility of the maintenance contractor.

6.2 HABITAT MAINTENANCE SCHEDULE

Regular maintenance, trash removal, and weed control of the vernal pool restoration area would be conducted during the first 5 years following implementation of the mitigation program or until the mitigation program is deemed successful. Maintenance personnel would visit the site at least monthly for the 5-year maintenance and monitoring period. Additional visits would be conducted as directed by the restoration specialist during the rainy season (generally December through May) each year to keep weeds under control.

7.0 SUCCESS CRITERIA

As discussed in Section 3.0, mitigation for impacts to 0.24 acre of vernal and road pools with and without fairy shrimp would be at a 5:1 ratio, and would consist of 1.14 acres of vernal pool restoration and preservation, and watershed enhancement of preserved pools. The loss of 114.4 acres of designated critical habitat with limited PCEs for San Diego fairy shrimp will be offset through the conservation and enhancement of the PCEs within 62.2 acres of critical habitat and 1.3 acres of essential habitat at the Lonestar Parcels. Impacts to rare plant species would be met through translocation of impacted populations from the Otay Business park site, and preservation of existing rare plant populations at the Lonestar Parcels. Impacts to owl burrows and occupied burrowing owl habitat would be met with the installation of 35 artificial burrows and the preservation of habitat.

The following sections provide performance standards to determine the successful completion of the 5-year mitigation and monitoring program. Attainment of these standards indicates the mitigation areas are progressing toward the habitat functions and services specified for this plan. Methods used to measure these success criteria are described in the following text. If the restored areas fail to meet the Year 5 standards after the full monitoring term, a specific set of remedial measures (approved by the CDFG, Corps, USFWS, and County) would be implemented, and the monitoring and maintenance period would be extended until all Year 5 standards are met or as otherwise provided in this document. Only areas failing to meet the success standards would require additional work (i.e., not all of the areas originally restored), and only when the entire mitigation site is meeting the Year 5 standards will the entire site be signed off.

7.1 RESTORED VERNAL POOLS

7.1.1 Control Pools

In order to measure the success of the restored vernal pools, up to 19 off-site preserved pools in Otay Mesa would serve as control pools. These control pools are separate from the pools selected for the CRAM analysis. The selected off-site pools are the same as those being used for the adjacent Caltrans SR-125 vernal pool restoration effort. Data collection in the pools will be coordinated between the different projects such that methods are the same and impacts to pools caused by monitoring will be minimized. Seven of the pools are located within the J-23 complex (Bauder 1986) adjacent to Johnson Canyon approximately 3,000 feet northeast of the restoration site. Vernal pool plant indicator species and native vernal pool associated species observed in the off-site control pools are presented in Table 10.

An additional 12 potential control pools are located 2 miles east of the Lonestar Parcels on the Upham Parcel. This parcel was previously being managed as a habitat preserve by The Environmental Trust. The pools on this site are within the J-26 complex. While not being actively managed, the J-26 pools are protected from grazing and off-highway vehicle (OHV) impacts by a barbed wire fence, making it a reliable control site. There have been some instances of disturbance in this area, including flooding from an adjacent broken pipeline. Only

non-disturbed pools within this complex will be used as control pools. Pools that become damaged or disturbed during the monitoring period will be removed from the list of control pools

In addition to the off-site pools, 2 of the on-site preserved pools will be selected as control pools during the first year annual monitoring event. The on-site control pools are scattered throughout the extant mima-mound topography of the Lonestar Parcels. The control pools will be of similar depth and vegetative makeup as those proposed for the mitigation site.

Success of the restored vernal pools would be determined by comparing species richness and vegetative cover with the control pools. A transect/quadrat sampling method would be used to monitor the restored pools (described in Section 8.1). The methods will be coordinated each year with other projects using the same control pools such that the methods and data collected will be compatible. Permanent transects and decimeter quadrats have been established within the off-site control pools and would be established in the on-site control pools and the restored pools. Each year, species richness and vegetative cover within the quadrats would be measured and recorded. This data would be used to determine if the restored pools have met the success criteria described below.

Table 10 CONTROL POOL VERNAL POOL PLANT SPECIES	
SCIENTIFIC NAME	COMMON NAME
Vernal Pool Indicators*	
<i>Callitriche marginata</i>	long-stalk water-starwort
<i>Centunculus minimus</i>	chaffweed
<i>Crassula aquatica</i>	dwarf pygmyweed
<i>Deschampsia danthonoides</i>	annual hairgrass
<i>Epilobium pygmaeum</i>	smooth boisduvalia
<i>Eryngium aristulatum</i> var. <i>parishii</i>	San Diego button-celery
<i>Lilaea scilloides</i>	flowering quillwort
<i>Navarretia fossalis</i>	spreading navarretia
<i>Pogogyne nudiuscula</i>	Otay mesa mint
<i>Plantago elongata</i>	dwarf plantago
<i>Psilocarphus brevissimus</i>	woolly marbles
Other Native Vernal Pool Associates	
<i>Eleocharis macrostachya</i>	pale spike-sedge
<i>Juncus bufonius</i>	common toad-rush

*Based on Corps Vernal Pool Plant Indicator List (Corps 1997)

7.1.2 Restored Vernal Pool Indicator Species Richness

Only native vernal pool indicator species (Corps 1997) and selected native vernal pool associates (Table 10) would be included in species richness (the number of species in a given area) in the restored vernal pool quadrats. Annual performance goals expressed as a percent of vernal pool indicator species in control pools are addressed in Table 11. Acceptable species richness within each restored pool at the end of the 5-year monitoring period is 100 percent of the average control pool vernal pool species richness. Meeting the 100 percent criterion by Year 5 would show that pools are functioning and that they would be expected to continue functioning. If the species richness criterion for a given year is not met, corrective measures (e.g., reseeding, excavation of a portion of a basin, introducing new inoculum, berming of a pool edge, etc.) may be taken to ensure eventual achievement of long-term goals.

Table 11 RESTORED VERNAL POOL SPECIES RICHNESS SUCCESS CRITERIA		
Year	Number of Indicator Species Relative to Control Pools (percent)*	Minimum Number of Indicator Species Present in each pool
1	35	1
2	50	1
3	65	2
4	80	3
5	100	3

* Greater than or equal to amount shown.

7.1.3 Restored Vernal Pool Indicator Species Cover

In addition to species richness, cover of native vernal pool and associated wetland plants within the restored pools would be used to determine project success. At the end of the 5-year monitoring period, the total cover of vernal pool plant species in each restored vernal pool should be 100 percent of the average total cover value for the control pools. Yearly performance goals have been set to track the progress of the mitigation effort (Table 12). After the first year, the relative cover in each of the restored vernal pools should be at least 25 percent of the average relative cover measured in the control pools for the same year. This percentage is expected to increase annually relative to the control pools. For Years 2 through 5, the percentage should be 35, 50, 70, and 90 percent, respectively. If the annual goals for relative cover are not being met, additional measures would be taken as necessary to ensure final success including the addition of supplemental inoculum.

Table 12 RESTORED VERNAL POOL PLANT COVER SUCCESS CRITERIA	
Year	Cover of Indicator Species Relative to Control Pools (percent)*
1	25
2	35
3	50
4	70
5	90

*Greater than or equal to amount shown.

7.1.4 Restored Vernal Pool Weed Cover

Non-native weed species anticipated to encroach upon the vernal pools include Italian ryegrass, grass poly (*Lythrum hyssopifolia*), curly dock (*Rumex crispus*), rabbitsfoot grass (*Polypogon monspeliensis*), filaree (*Erodium* spp.), pacific bent grass (*Aristida avenaceae*), and nit grass (*Gastridium ventricosum*). Of these weed species, Italian ryegrass is considered to be the most significant competitor to native vernal pool species. Elimination of this species would be the main focus of the vernal pool weed control effort. Relative cover of Italian ryegrass shall not exceed one percent during the 5-year monitoring period. Control of weed species categorized as High or Moderate in the California Invasive Plant Council (Cal-IPC) 2006 Invasive Plant Inventory shall be conducted such that at the end of the 5-year monitoring period the total cover of such weed species in each restored vernal pool is less than one percent and total cover of weed species does not exceed 5 percent (Table 13). If weed cover criteria are not being met, additional maintenance effort would be required. Table 14 includes Cal-IPC listed species likely to occur within the mitigation project area.

Table 13 COVER LIMITS FOR NON-NATIVE SPECIES IN RESTORED VERNAL POOLS	
Cal-IPC Moderate or High species	<1%
Other non-native species	<5%
Absolute cover for all non-native species (Cal-IPC and others combined)	<5%

Table 14 CALIFORNIA INVASIVE PLANT COUNCIL MODERATELY TO HIGHLY INVASIVE PLANT SPECIES*	
SCIENTIFIC NAME	COMMON NAME
<i>Avena</i> spp.	wild oats
<i>Brassica nigra</i>	black mustard
<i>Bromus diandrus</i>	ripgut brome
<i>Bromus madritensis</i> ssp. <i>rubens</i>	red brome
<i>Centaurea melitensis</i>	toocalote
<i>Foeniculum vulgare</i>	fennel
<i>Hirschfeldia incana</i>	shortpod mustard
<i>Lolium multiflorum</i>	Italian ryegrass
<i>Lythrum hyssopifolia</i>	grass poly
<i>Vulpia myuros</i>	rattail fescue

*California Invasive Plant Council (Cal-IPC) 2006 Invasive Plant Inventory

7.1.5 Enhanced/Preserved Vernal Pool Success Criteria

The enhancement effort in the preserved pools is far less intensive than in the restored pools, consisting of an initial dethatching and periodic mowing of grasses. The goal of this effort is to help improve pool function (hydrology, wildlife, and plants) by reducing the dense thicket of non-native grasses that fill in many of the pools on an annual basis. In order to help direct this effort, success criteria have been established for the enhanced pools. The success goals for the enhanced pools include: exhibiting suitable ponding duration (7 – 14 days) to support San Diego fairy shrimp; stable or increasing presence of native vernal pool plant indicator species; and 0% cover of Cal-IPC list A-1 and A-2 species. The maintenance and monitoring effort will be directed to meet these goals; however, if the project fails to meet some or all of these goals and it can be shown that the maintenance effort was adequately performed, the project may still be deemed successful, provided the other success criteria are met.

7.2 SITE DETHATCHING

The goal of the dethatching is to improve the upland portion of the site for burrowing owls and also to help increase the water holding capacity of the preserved pools on site. Because of its somewhat experimental nature, there are no specific success criteria for the dethatching of the Lonestar Parcels. Implementation of the dethatching effort will be considered successful if the watershed dethatching is carried out correctly and in a timely manner. With improved ponding characteristics, it is anticipated that the preserved pools will better support the San Diego fairy shrimp. The project will include monitoring of both the owl presence and hydrology/fairy shrimp presence in the preserved pools to help determine if the effort is working. If, after the third year of monitoring the preserved pools do not exhibit improved ponding characteristics additional measures may be explored.

7.3 CRAM REFERENCE SITE/TARGET VALUES

A CRAM assessment for existing Lonestar pools was conducted by HELIX biologists Ms. Trnka and Erica Harris on March 3, 2011. In addition, off-site reference site pools were similarly assessed on March 12, 2011 by Ms. Trnka and Ms. Mattson. A CRAM assessment of the proposed mitigation site is not applicable, as the area does not currently support vernal pools and the proposed mitigation consists of creation of new pools in this area. The reference site pools consist of restored pools (i.e. created pools) on the restoration site directly south of the proposed mitigation. CRAM was conducted in 3 reference pools. CRAM also was conducted for 3 existing vernal pools on the Lonestar Parcel, north of the proposed vernal pool restoration area. The sampled pools were selected as a representative sampling of the varied size and quality of pools currently present at the Lonestar site and reference site.

The CRAM score for each of the existing pools was 52, while the CRAM scores for the reference site pools varied between 61 and 67, with a mean CRAM score of 65. The metric results for the Buffer and Landscape Context and Hydrology attributes are largely the same for the existing pools and the reference site pools, resulting in the same overall scores for these attributes (56 for Buffer and Landscape Context and 100 for Hydrology). The Buffer and Landscape Context attribute score was moderate, largely as a result of low scores for Landscape Connectivity (i.e., few wetlands within 500 m of the pools). The Hydrology attribute scores were high because the water source for the pools is mainly from rainfall coming directly into the basins, which fill and drain in natural cycles, and flow from the pools is largely unrestricted. The reference site scored higher than the existing site in both the Physical Structure and Biotic Structure attributes, scoring an average of 38 and 67, respectively, compared to the existing pool scores of 25 for both attributes. These higher scores are due to increased structural patch richness, higher species richness values, and less cover by non-native species at the reference site pools. Scoring sheets for the analyzed pools are included in Appendix A.

Typically, to fulfill the minimum requirement for no net loss of wetland functions and services, the net gain in CRAM scores at a mitigation site must be equal to or greater than the loss at the impact site. The mean CRAM score for the selected reference site is 65, 13 points higher than the mean CRAM score for both the impact site and the existing Lonestar Pools (Table 15). It is reasonable to expect that the mean score for the reference pools are attainable by the pools proposed by this project, and because the mitigation pools will consist of newly restored pools, the minimum score needed for the mitigation pools is 52 (equal to the mean score of the impacted pools).

Based on the reference site, the maximum possible CRAM score for the mitigation site was estimated to be 65; a minimum score of 52 within each pool is required (based on the scores at the impact pools; Table 15). Because the proposed mitigation would consist of the restoration of new pools where none currently exist (and, therefore, the pre-restoration CRAM score is zero), a mitigation ratio of 1:1 would attain a functional lift of 52 points for each restored pool. It should be noted that using the CRAM scores in this very simplified way and as the only factor in determining the mitigation ratio is not typical for the Corps. The Corps currently utilizes 5 factors to establish mitigation ratios including mitigation site location, type, type conversion, uncertainty, and temporal loss. Several of these factors may weigh heavily in determining the

Corps mitigation ratio for a project affecting vernal pools because they are a difficult aquatic resource to replace. Based on consultation with the Corps, USFWS, and RWQCB the combined mitigation ratio for this project is 5:1.

Table 15
CRAM DATA SUMMARY

CRAM Attributes	METRICS	BASELINE SCORES ¹				TARGET SCORES	
		Impact Site	Existing Lonestar Pools	Reference Site	Post-Restoration Mitigation Pools ²	Year 3	Year 5
Buffer and Landscape Context	Landscape Connectivity	3	3	3		3	3
	Buffer Sub-metrics:						
	- Percent of Assessment Area with Buffer	12	12	12		12	12
	- Average Buffer Width	11	12	12		12	12
	- Buffer Condition	6	9	9		9	9
	Attribute Score (Raw/Final)	11/47	13/56	13/56		13/56	13/56
Hydrology	Water Source	12	12	12		12	12
	Hydroperiod	9	12	12		12	12
	Hydrologic Connectivity	12	12	12		12	12
	Attribute Score (Raw/Final)	33/92	36/100	36/100		36/100	36/100
Physical Structure	Structural Patch Richness	5	3	5		5	5
	Topographic Complexity	3	3	4		4	4
	Attribute Score (Raw/Final)	8/33	6/25	9/38		9/38	9/38
Biotic Structure	Plant Community Sub-metrics:						
	- Number of Co-dominant Species	4	3	4		4	4
	- Percent Invasion	3	3	12		8	12
	- Endemic Species Richness	3	3	4		3	4
	Horizontal Interspersion and Zonation	5	3	9		3	9
	Attribute Score (Raw/Final)	9/37	6/25	16/67		8/35	16/67
Overall Score		52	52	65		57	65

1 Mean scores calculated from CRAM scores conducted on 5 impact site pools, 3 existing Lonestar pools, and 3 off-site reference site pools.

2 To be conducted immediately following restoration installation

7.4 FAIRY SHRIMP

All of the restored vernal pools are intended to provide habitat for San Diego fairy shrimp. Some of the basins are designed to be deep enough to support a hydrological regime long enough to support Riverside fairy shrimp. Fairy shrimp sampling (wet and dry) would be conducted each season and the number of shrimp/cysts present in each pool would be estimated. The number of gravid females also would be estimated. Fairy shrimp data also would be collected in the control pools to help gauge the success of the restoration effort. At the end of the 5-year monitoring period a minimum of .42 acre of restored pool surface area must support fairy shrimp. In order for the fairy shrimp portion of the project to be considered successful, the shrimp (with gravid females) should recur in each year that there is enough rainfall to produce ponding, and shrimp should also be present in the control pools.

Additionally, the survey data must show that the populations are stable or increasing, relative to the control pools. If both the restored and control pool shrimp populations/cyst banks decline in any given year, then it would be assumed that there are other outside, seasonal effects driving the change, as opposed to specific factors at the restoration site. Otherwise, the restored pool population numbers should either be stable or show an increasing trend over the 5-year monitoring period to be considered successful. If the restored pools exhibit appropriate hydrology but do not have sufficient presence of fairy shrimp, additional inoculum would be added.

Versatile fairy shrimp (*Branchinecta lindahli*) may co-occur with San Diego fairy shrimp in pools in Otay Mesa. All wet season fairy shrimp monitoring will document the presence and abundance of versatile fairy shrimp, if any. The presence of versatile fairy shrimp will not be counted in determining success of the pool restoration.

7.5 TARGET HYDROLOGICAL REGIME

As previously stated, vernal pools restored under this mitigation program are primarily designed to emulate the conditions found in existing vernal pools on Otay Mesa. The restored pools would be excavated and situated to capture rainfall and runoff from the open space preserve. Restoration of the natural topography and the removal of weeds would restore the normal hydrological functions within the restored vernal pool complex.

During the 5-year monitoring period, water depth in the control pools and the restored vernal pools on site would be measured. Measurements would be taken every 2 weeks during each rainy season throughout the monitoring period. The depth and extent of ponding (surface area) would be recorded during each site visit in each restored vernal pool. This data would be used to create graphs showing extent, depth, and duration of ponding. At the end of the 5-year monitoring period, the monitored pools would demonstrate hydrologic patterns similar to those of the control pools. The monitoring period will be extended if a drought period prevents the pools from demonstrating the desired hydrologic patterns. The pools must pond for sufficient time (estimated to be 30 days) to support San Diego fairy shrimp during 2 winters in a 5-year monitoring period or 3 winters in a 10-year monitoring period. This allows the resource agencies

to be confident that the pools physical and chemical structure support a viable population of fairy shrimp vs. the possibility of cysts inoculated emerging a single time.

7.6 RARE PLANT TRANSLOCATION

The goal of the variegated dudleya translocation effort is to obtain populations of similar size to the impacted population by the end of the 5-year restoration program. At the end of each year, if the population does not appear to be progressing toward this goal, variegated dudleya plantings or seed will be obtained from a native plant nursery and applied to the restoration area.

At the end of each year, survivorship of San Diego barrel cactus will be tabulated. If there is a survivorship of less than 90 percent, additional San Diego barrel cactus will be obtained from a native plant nursery and added to the restoration site to replace lost individuals.

At the end of the 5-year restoration program at least 2 restored pools will support San Diego button celery and spreading navarretia with no less than 6 individuals of each species occurring within the restoration area. Additional seed of these species may be collected and placed in the pools if it appears that the success criterion will not be met. Any collection must be approved by the USFWS.

7.7 NATIVE GRASSLAND RESTORATION AREA

During annual monitoring, species richness in the native grassland area in the vernal pool restoration area would be determined only by visual assessment in Years 1 and 2, and by visual assessment and transect data in Years 3, 4, and 5. No specific richness criteria are established for Years 1 or 2, but annual success criteria for species richness in Years 3, 4, and 5 are provided in Table 16. As suitable native grassland reference sites are not known on Otay Mesa, success will not be compared to a reference site. Instead, success will be measured relative to predetermined richness values. If the species richness goal for a given year is not met, corrective measures (including reseeding and planting) would be implemented to ensure achievement of long-term restoration goals.

Table 16 NATIVE GRASSLAND RESTORATION SPECIES RICHNESS SUCCESS CRITERIA	
YEAR*	SPECIES RICHNESS
3	5
4	6
5	8

*No success criteria for Years 1 and 2

In addition to species richness, project success would be determined based on native and non-native (weed) plant cover. Table 17 presents vegetative cover success criteria for Years 3, 4, and 5 in the native grassland restoration area. No specific richness criteria are established

for Years 1 or 2 in the native grassland restoration area. Several species of weeds are particularly problematic in the vicinity of the restoration site. Control of these target, invasive, site specific, weed species (Table 18) shall be conducted such that at the end of the 5-year monitoring period, the total cover of these weed species within the native grassland is less than one percent and total cover of all weed species does not exceed 5 percent (Table 17). If annual goals for vegetative cover are not met, remedial measures, including reseeding, planting, and weeding, may be implemented to ensure final success.

Table 17 NATIVE GRASSLAND RESTORATION VEGETATIVE COVER SUCCESS CRITERIA (percent cover)			
YEAR*	NATIVE SPECIES	NON-NATIVE SPECIES	TARGET WEEDS†
3	>25	<10	<5
4	>35	<5	<1
5	>45	<5	<1

*No success criteria for Years 1 and 2

†Table 18

Table 18 TARGET NATIVE GRASSLAND WEED SPECIES	
SCIENTIFIC NAME	COMMON NAME
<i>Atriplex semibaccata</i>	Australian saltbush
<i>Brassica nigra</i>	black mustard
<i>Centaurea melitensis</i>	totalote
<i>Foeniculum vulgare</i>	fennel
<i>Hirschfeldia incana</i>	shortpod mustard
<i>Lolium multiflorum</i>	Italian ryegrass

As mima mound habitat suitable for the long-term preservation of vernal pools currently exists within the vernal pool restoration area, no success criteria are proposed for the Diegan coastal sage scrub habitat enhancement. Installation and maintenance of Diegan coastal sage scrub species would enhance the vernal pool watersheds and successful establishment would enhance the value of the mitigation site, but is not essential for continued pool function.

7.8 SUCCESS CRITERIA FOR ARTIFICIAL BURROWS

The degree to which burrowing owls utilize artificial burrows and foraging habitat will be documented through the monitoring program; however, there are no success criteria for this effort. If this burrowing owl mitigation plan is implemented correctly, and burrowing owls are

not found to be utilizing the artificial burrows or preserved foraging habitat, there will be no consequences for the project proponent. Installation of artificial burrows and preservation of habitat is considered successful mitigation.

7.9 SUCCESS CRITERIA FOR FOCUSED QCB PLANTING AREAS

A minimum of 6 focused planting areas shall be established that support habitat dominated by QCB host and nectar resource plants. The planting areas must have less than 10% cover of exotic plant species and 0% cover of Cal-IPC List A-1 and A-2 species during the 5-year maintenance and monitoring period.

7.10 CONTAINER STOCK SURVIVAL

Container plant survival will be 80 percent of the initial plantings during each annual monitoring event, for all five years of maintenance and monitoring. At the first and second anniversary of plant installation, all dead plants will be replaced unless their function has been replaced by natural recruitment.

7.11 SUCCESS CRITERIA SUMMARY

A summary of the project's success criteria is presented below in Table 19.

Table 19 SUCCESS CRITERIA SUMMARY		
VERNAL POOL SPECIES RICHNESS SUCCESS CRITERIA		
Year	Number of Indicator Species Relative to Control Pools (percent)	Minimum Number of Indicator Species Present in each Pool
1	35	1
2	50	1
3	65	2
4	80	3
5	100	3
VERNAL POOL PLANT COVER SUCCESS CRITERIA		
Year	Cover of Indicator Species Relative to Control Pools (percent)	
1	25	
2	35	
3	50	
4	70	
5	90	

Table 19 (cont.) SUCCESS CRITERIA SUMMARY			
COVER LIMITS FOR NON-NATIVE SPECIES IN VERNAL POOLS			
Cal-IPC Moderate or High species			<1%
Other non-native species			<5%
Absolute cover for all non-native species (Cal-IPC and others combined)			<5%
NATIVE GRASSLAND RESTORATION SPECIES RICHNESS SUCCESS CRITERIA			
Year*		Species Richness	
3		5	
4		6	
5		8	
NATIVE GRASSLAND RESTORATION VEGETATIVE COVER SUCCESS CRITERIA			
Year*	Native Cover**	Non-native Cover†	Target Weeds‡
3	≥25	<10	<5
4	≥35	<5	<1
5	≥45	<5	<1

*No success criteria for Years 1 and 2

** percent relative to reference transect

† total cover – not relative to reference

8.0 MONITORING PLAN

8.1 MONITORING METHODS

Monitoring would be carried out by the restoration specialist to assess the progress of the restoration effort and determine any appropriate remedial measures. Monitoring by the restoration specialist allows for the identification of action items and the implementation of adaptive strategies to achieve high functioning habitat and reach final performance standards. Quantitative success criteria presented above (Section 7) would be used to measure mitigation success. Final and yearly success criteria are included to measure interim and ultimate habitat development.

8.1.1 Vernal Pools

Maintenance Monitoring

Monthly inspections of the restoration and maintenance efforts would be performed during Year 1, every other month during Year 2, and every 3 months during the remainder of the

monitoring period. As conditions warrant, additional site visits may be required during the initial installation/establishment period.

Fairy Shrimp Monitoring

Wet season fairy shrimp monitoring visits would be conducted every other week during the rainy season of each year to monitor pool hydrology and conduct wet season fairy shrimp surveys. These surveys will be conducted in all of the restored pools, the control pools, and in a minimum of 10 selected enhanced/preserved pools. During each of these visits, depth, extent, and duration of inundation of all pools (mitigation and control) would be measured. Depth measurements would be taken following the onset of winter rains and would continue until May 15 or until all pools are dry. Plant and animal species observed in each pool during the monitoring visits would be recorded.

The purpose of the fairy shrimp surveys is to determine presence/absence of San Diego and Riverside fairy shrimp in the restored pools, in particular the estimated population size of hatched fairy shrimp, and estimates on the number of gravid female. The presence of other faunal species occupying the pools also would be noted during the surveys. The results of the fairy shrimp surveys would be included in the annual monitoring reports.

Additional water chemistry data will be collected during the fairy shrimp sampling of the restored pools. The data collected will include temperature, pH, conductivity, TDS, and salinity. This same data will be collected within a minimum of 10 representative pools from the preserved/enhanced pools on site. Results will be recorded and compared with fairy shrimp presence in the annual report for each year. This data is intended to contribute to the general body of knowledge regarding necessary water quality characteristics for fairy shrimp survival and is not a component of project success determination (i.e. there are no associated success criteria).

Dry season fairy shrimp surveys also will be conducted in the fall of each year, prior to the onset of the rainy season. The survey will involve collecting soil samples from the restored vernal pools along with a minimum of 10 preserved/enhanced pools and 5 control pools that are known to support fairy shrimp. The sampling will consist of 3 core samples (approximately 1.5 – 2 cubic inches in volume) taken in the deepest portion of each sampled pool. The samples will be analyzed by a USFWS qualified biologist to determine the genus and density of cysts collected. This data will be used to track any trends in cyst densities in the monitored pools.

Annual Monitoring

An annual monitoring visit would be conducted each year near the end of the rainy season when most vernal pool species are visible. The exact timing of annual monitoring would be dependent upon the time and amount of rainfall received each year. Monitoring would use standard techniques and be based on transect/quadrat sampling. The transect monitoring will be conducted in all of the restored pools, the control pools, and in a minimum of 10 preserved/enhanced pools. Permanent transects would be established from pool edge to pool edge through the deepest portion of each pool. Each transect would be marked with rebar stakes

at both ends and labeled with caps indicating the pool number. Decimeter quadrats would be measured at regular intervals along each transect. Each plant species present within each quadrat would be recorded, with the cover of each species estimated. Furthermore, the total vernal pool, native, and non-native covers for each quadrat would be estimated. A species list would be recorded for each pool, consisting of all species observed in the annual sampling transect and any other species observed in each pool during annual monitoring events. This species list will be used to determine pool species richness.

Photo documentation points shall be established for the preserve area, and photographs would be taken of each pool during the annual monitoring event. Representative photos would be provided in the annual monitoring report.

8.1.2 Upland Habitat

Native Grassland

The status of the native grassland area would be noted during each monitoring visit throughout the year. Overall health and vigor of the upland habitat would be qualitatively recorded. Species cover, richness, and weed cover would be visually estimated.

During annual monitoring, species richness in the native grassland upland area would be determined by visual assessment only in Years 1 and 2 and by visual assessment and quantitative transect data in Years 3, 4, and 5.

Quantitative measurements of plant growth would be taken along transects using the point intercept line transect sampling methods described in the California Native Plant Society's Field Sampling Protocol (Sawyer and Keeler-Wolf 1995). Two 25-m long by 5-m wide sampling transects would be established in Year 3. Each transect end would be physically marked, and have its location recorded with a Global Positioning System (GPS) unit. With this transect sampling method, a point would be projected into the vegetation at 50-centimeter (cm) intervals along each transect and each species intercepted by the point would be recorded. For this site, plants would be divided into 3 height categories: herb layer (between 0 and 60 cm), shrub layer (between 61 cm and 3 m), and tree layer (greater than 3 m).

To calculate total vegetation percent cover, the number of points that intercept live plant material is summed and divided by the total number of intercepts possible along that transect. Multiple hits of plants at a single point resulting from overlap of 2 or more species were counted as a single hit for this calculation. To calculate the percent cover contributed by each species, the number of intercepts by each species is divided by the number of possible intercepts for the transect (i.e., 100).

All plant species observed within the 25 m by 5 m belt transect (excluding those within vernal pools) would be recorded and used to calculate the species richness. All plants observed would be categorized by origin (native/non-native) and stratum (herb, shrub).

Photographs would be taken each year from the same locations to monitor change over time, and would be included in each annual report. Photopoints would be physically marked and have their locations recorded with a GPS unit.

Diegan Coastal Sage Scrub

Diegan coastal sage scrub habitat in the uplands around the restored vernal pools will be qualitatively monitored during each annual monitoring event. Photographs would be taken each year.

QCB Habitat

The QCB habitat focused planting areas would be qualitatively inspected during each annual monitoring event. Observations would be taken on native and non-native plant cover and species diversity.

Rare plant

During the annual monitoring visit the number and species cover within the variegated dudleya area will be visually estimated. The collected data will be used to determine the success of the planted area.

The survivorship of transplanted San Diego barrel cactus and of container stock cactus plantings will be recorded.

8.1.3 Artificial Burrows

Monitoring of the artificial burrows shall be carried out by a qualified biologist and shall include the following observations: presence of owls and other burrowing animals, burrow use, general available prey base, vegetation condition (in particular height) around burrows, other predatory animal species that could prey on burrowing owls and/or compete with them for food, and any maintenance concerns as described above.

Monitoring shall occur for 5 years according to the schedule below. The majority of visits occur during the breeding (April 15 through July 15) and wintering seasons (December 1 through January 31) of burrowing owls. This schedule is designed under the assumption that monitoring would begin following artificial burrow construction. The specialist shall have reasonable flexibility to alter the exact timing of monitoring events in response to on-site observations/conditions.

Monitoring would occur according to the following schedule:

- Year 1 (12 monitoring events; one monitoring event per month).
- Years 2 through 5 (8 monitoring events per year) as follows: December 1 through January 31 – 3 logically spaced events; February 1 through April 14 – one event; April 15 through July 15 – 3 logically spaced events; and July 16 through November 30 – one event.

Monitoring events should occur concurrently with other site monitoring visits (e.g. maintenance monitoring, fairy shrimp surveys).

8.2 ANNUAL REPORTS/INVITATION

As part of the monitoring program, annual reports prepared by the restoration specialist would be submitted to the County, Corps, CDFG, and USFWS evaluating the success of the vernal pool mitigation effort to date, along with any recommendations for future work that may be deemed necessary. These reports will include an evaluation of the success of the burrowing owl effort to date. Each annual monitoring report would include data collected throughout the year in addition to the annual monitoring visit. Annual monitoring reports would provide comparisons of the annual monitoring data to the control site for that year. To detect the overall trend of the site, the annual monitoring report would contain comparisons of the monitoring data for the years that data are collected. As part of the annual reporting, the CRAM data and vernal pool boundaries will be uploaded to the cramwetlands.org website and the data provided in the annual monitoring report. This data can then be used to further the calibration of CRAM for vernal pools such that if the method is updated during the monitoring period, the data can be cross-walked easily by the project restoration specialist and by the CRAM managers.

The USFWS, Corps, CDFG, RWQCB, and County shall be annually invited to view the mitigation site.

8.3 ADAPTIVE MANAGEMENT

If any annual goals for the project are not being met, or the restoration specialist observes that some aspect of the restoration program requires attention, adaptive measures would be implemented. Adaptive measures for vernal pool restoration project may include but are not limited to: importing new soil inoculum from an off-site source, recontouring of non-functioning pools, increasing weed maintenance frequency or intensity, and re-seeding with commercially available or collected seeds from the immediate area.

If the native grassland restoration within the restored vernal pool watershed area does not achieve the desired levels of cover or richness, adaptive management measures could include: additional planting or seeding, altered maintenance effort, and increased irrigation regime. Additional measures may be implemented in the vernal pool enhancement area if deemed necessary.

Native plants in the existing non-native grasslands on site are expected to emerge after grass thatch has been removed. During the second annual monitoring, the restoration specialist will assess the

uplands (watershed enhancement area) for the emergence of natives. If native plants are not emerging as expected, the site will be seeded with a mix of native forb and shrub species.

Artificial owl burrows will be monitored for integrity and will be repaired if erosion or sedimentation occurs around the entrances.

If maintenance monitoring indicates that the restoration program is not progressing towards meeting its performance standards as anticipated, the restoration specialist must notify the regulatory agencies as soon as possible, suggest site specific recommendations, and work with the regulatory agencies to address deficiencies. The goal of adaptive management is to ultimately provide vernal pool and grassland functions consistent with those described in this restoration plan.

8.4 SCHEDULE

As described above, monthly inspections of the restoration and maintenance effort would be performed during Year 1, every other month during Year 2, and every 3 months for the remainder of the monitoring period. Monitoring events that focus on botanical data collection (i.e., percent cover, density, phenology, etc.) would occur annually for 5 years. Reports would be prepared and submitted to the USFWS, Corps, CDFG, and County by September 1 of each year to ensure that adequate time remains in the dry season to make any necessary alterations to the preserve areas.

9.0 COMPLETION OF MITIGATION

9.1 NOTIFICATION OF COMPLETION

The permittee shall notify the USFWS, Corps, CDFG, and County of completion of the mitigation effort through submittal of a final (Year 5) monitoring report. The final monitoring report would include a jurisdictional delineation of the mitigation areas. This delineation must show that the goals of the mitigation program (as described in Section 3) have been met. The Permittee will set up a site visit with the resource agencies and only once the permittee receives a written confirmation from the resource agencies that the site had meet its success criteria will maintenance and monitoring cease.

9.2 AGENCY CONFIRMATION

After receipt of the final monitoring report, the USFWS, Corps, CDFG, and County may inspect the mitigation site to determine the success of the restoration effort. After evaluating the final report, the agencies shall determine if the restoration effort is acceptable.

9.3 LONG-TERM MANAGEMENT

Prior to initiation of project impacts, a Biological Open Space Easement or Conservation Easement dedication will be recorded over the vernal pool mitigation areas. This easement will be in favor of an entity approved by the Service. The Service will be named as third party

beneficiary in the conservation easement and the terms of the easement will be approved by the Service prior to its execution. This easement will state that no other easements or activities (e.g., fuel modification zones, public trails, drainage facilities, walls, maintenance access roads) that would result in soil disturbance and/or vegetation removal will be allowed within the biological conservation easement area. A draft conservation easement agreement will be submitted to the Service for review and approval at least 90 days prior to initiating project impacts and will not initiate project impacts until the easement is approved by the Service. The final easement and evidence of its recordation will be submitted to the Service within 90 days of recordation of the final map. These areas will be turned over in fee-title to the County, the NWR, or a non-profit organization, and approved by the Service dedicated to the preservation of sensitive lands. Long-term management of the vernal pool mitigation areas would be the responsibility of the organization accepting the fee-title. As of the writing of this report, no entity has been chosen to accept long-term responsibility of the restoration areas. Potential entities could include the County, USFWS, CDFG, or a non-profit land management company. Long-term management would be conducted according to the Resource Management Plan for Otay Business Park Off-Site Biological Open Space at Lonestar Ridge (HELIX 2011b).

10.0 CONTINGENCY MEASURES

10.1 INITIATING PROCEDURES

If the Corps, CDFG, USFWS, and County determine upon receipt of any of the annual monitoring reports that the restoration effort is not meeting success standards for the project, the Corps, CDFG, USFWS, and County shall notify the project proponent in writing (via letter or email) that the restoration effort may require augmentation for successful implementation. The project proponent shall then have 30 days to respond to the notification. During this period, the project proponent may discuss alternatives to the suggestions of the USFWS, Corps, CDFG, and County.

10.2 FUNDING MECHANISM

The permittee (Section 4.5) shall be responsible for all costs associated with any remedial measures.

10.3 RESPONSIBLE PARTIES

The permittee shall be the responsible party for any remedial measures.

11.0 LIST OF PREPARERS

The following individuals contributed to the preparation of this report.

Greg Mason	B.S., Natural Resources Planning & Interpretation, Humboldt State University, 1992
Dale Ritenour*	B.S., Biology (emphasis in Ecology), San Diego State University, 1998
Aleksandra Richards	M.A., International Relations, University of San Diego, 2010 B.A., Communications, California State University Fullerton, 2008
Phillip Tran	J.D., Law, Seattle University School of Law, 2001 M.A., Communication, San Diego State University, 1998 B.A., Political Science, University of California-San Diego, 1994

*Primary preparer

12.0 REFERENCES

- Bauder, E. 1986. San Diego Vernal Pools: Recent and projected losses; their condition; and threats to their existence 1979-1990. Vols. 1 & 2. Prepared for the Endangered Plant Project, CDFG.
- Barclay, John H. 2008. A Simple Artificial Burrow Design for Burrowing Owls. *Journal of Raptor Research*. 42 (1) 53-57.
- California Department of Fish and Game (CDFG). 1995. Memorandum. Staff Report on Burrowing Owl Mitigation. October 17.
- California Invasive Plant Council (Cal-IPC). 2006. California Invasive Plant Inventory. February.
- California Rapid Assessment Methodology (CRAM). 2009. Individual Vernal Pools Field Book. Version 5.0.3. March 30.
- Collins, J.N., E.D. Stein, M. Sutula, R. Clark, A.E. Fetscher, L. Grenier, C. Grosso, and A. Wisking. 2008. California Rapid Assessment Method (CRAM) for Wetlands. Version 5.0.2. 151 pp.
- County of San Diego. 2007. Resource Protection Ordinance. Ordinance No. 9842 (New Series): An Ordinance Codifying and Amending the Resource Protection Ordinance, Relating to Wetlands, Prehistoric and Historic Sites, Agricultural Operations, Enforcement, and Other Matters. Updated from 1991 Ordinances compilation. March 21.
1994. East Otay Mesa Specific Plan. July.
1997. Multiple Species Conservation Program, County of San Diego Subarea Plan. October 22.
- Hanes, T. and H. Stromberg. 1998. Hydrology of Vernal Pools on Non-Volcanic Soils in the Sacramento Valley. Ecology, Conservation and Management of Vernal Pool Ecosystems – Proceedings from a 1996 Conference. CNPS, Sacramento, CA.
- HELIX Environmental Planning, Inc. (HELIX). 2011a. Biological Technical Report for Otay Business Park. October 17.
- 2011b. Resource Management Plan for Otay Business Park Off-site Biological Open Space at Lonestar Ridge. October 17.
2009. Biological Technical Report for Lonestar Industrial Park. May 22.
2006. Year 4 Monitoring Report for Redhawk Fairy Shrimp Mitigation Area. November 14.

- RECON. 1997. Dennery Canyon Vernal Pool, Coastal Sage Scrub, and Mule Fat Scrub Restoration and Preservation Plan.
- Sarver, Matthew J., ed. 2007. Farm Management for Native Bees: a Guide for Delaware. Dover, DE: USDA NRCS and Delaware Department of Agriculture.
- Scheidlinger, C., C. Patterson, and P. Zedler. 1985. Recovery of Vernal Pools and their Associated Plant Communities Following Disturbance: Miramar, San Diego County, CA.
- Soil Ecology Restoration Group (SERG). Restoration Bulletin #6. Irrigation for Remote Sites. URL: <http://www.sci.sdsu.edu/SERG/techniques/Irrigation.pdf>.
- U.S. Army Corps of Engineers (Corps). 1997. Vernal Pool Plant Indicator Species List. November.
- Zedler, Paul. 1990. Life Histories of Vernal Pool Vascular Plants. Vernal Pool Plants: Their Habitat and Biology. CSU Chico. June.

THIS PAGE INTENTIONALLY LEFT BLANK



Appendix A

CRAM SCORING SHEETS AND BUFFER ANALYSES



Basic Information: Individual Vernal Pools

Which best describes the hydrologic state of the wetland at the time of assessment?

☒ ponded/inundated ☐ saturated soil, but no surface water ☐ dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration ☐ short-duration

Does the individual vernal pool connect with the floodplain of a nearby stream? ☐ yes ☒ no

photo 384 = P1
85

Sally Trnka
Amy Mattson

Scoring Sheet: Individual Vernal Pools

AA Name: <u>P-1</u>				(m/d/y) <u>02/27/11</u>		
Attributes and Metrics			Alpha.	Numeric	Comments	
Buffer and Landscape Context						
→ (A) Landscape Connectivity			<u>D</u>	<u>3</u>	only road/vernal pools w/in 500m	
→ (B): Percent of AA with Buffer	Alpha.	Numeric	<u>A</u>	<u>12</u>	100% w/ buffer	
(C): Average Buffer Width	<u>A</u>	<u>12</u>			250m	
→ (D): Buffer Condition	<u>C</u>	<u>6</u>			non-native grassland & dirt rd.	
Initial Attribute Score = $A + [D \times (B \times C)]^{1/2}$ $3 + [6 \times (12 \times 12)]^{1/2}$				<u>11.4</u>	Final Attribute Score = (Initial Score/24) x 100 <u>47.5</u>	
Hydrology						
→ Water Source			<u>A</u>	<u>12</u>	natural precipitation	
→ Hydroperiod			<u>B</u>	<u>9</u>	slightly deeper portions due to vehicle travel	
→ Hydrologic Connectivity			<u>A</u>	<u>12</u>	unrestricted	
Initial Attribute Score				<u>33</u>	Final Attribute Score = (Initial Score/36) x 100 <u>91.7</u>	
Physical Structure						
Structural Patch Richness			<u>D</u>	<u>3</u>	very simple pool in rd.	
Topographic Complexity			<u>D</u>	<u>3</u>	no slope (or very slight), road ruts	
Initial Attribute Score				<u>6</u>	Final Attribute Score = (Initial Score/24) x 100 <u>25</u>	
Biotic Structure						
Plant Community submetric A: Number of Co-dominant species	Alpha.	Numeric	<u>C</u>	<u>6</u>	3 species 67% 0 endemic	
Plant Community submetric B: Percent Invasion	<u>D</u>	<u>3</u>				
Plant Community submetric C: Endemic Species Richness	<u>D</u>	<u>3</u>				
Plant Community Metric (average of submetrics A-C)				<u>4</u>		
Horizontal Interspersion and Zonation				<u>C</u>	<u>6</u>	2 main zones
Initial Attribute Score				<u>10</u>	Final Attribute Score = (Initial Score/24) x 100 <u>41.7</u>	
Overall AA Score (Average of Final Attribute Scores)					<u>51.5 = 52</u>	

$205.9/4 =$

Worksheet 1: Landscape Connectivity Metric for Individual Vernal Pools.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	<5%
South	<5%
East	10% <5%
West	10% <5%
Average Percent Crossing Aquatic Area for all Four Transects	10% <5%

Worksheet 2: Calculating average buffer width of AA.

Transect	Buffer Width (m)
A	>250m
B	↓
C	
D	
E	
F	
G	
H	↓
Average Buffer Width	250m

Worksheet 3: Structural Patch Type for Vernal Pool Systems.

Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for presence
Small individual pools	✓
Large individual pools	
Small swales	
Large swales	
More than 1 pool cluster (a set of 3 or more interconnected pools with nearest neighbors less than 5 m apart)	
Drainage branches (more than 1 drainage branch)	
Simply-shaped pools (mostly round or oval)	
Complexly-shaped pools (not mostly round or oval)	✓
Plant hummocks	
Mima mounds	
Animal burrows	
Bare soil	✓
Soil cracks	
Cobble	
Total Possible	14
No. Observed Patch Types (enter here and use in Table 15)	3

- based on presence of road ruts, which vary year to year, day to day

Worksheet 4a: Plant Community Metric –

Co-dominant Plant Species in Individual Vernal Pools.

Note: A dominant species represents $\geq 10\%$ relative cover. Count species only once when calculating any Plant Community sub-metric.

Co-dominant Species	
Hordeum jubatum	
Lepidium sp. Avena sp.	
Malva parviflora	
Total number of co-dominant species	3

Worksheet 4b: Plant Community Metric –

List of Unique Co-dominant Plant Species in Individual Vernal Pool.

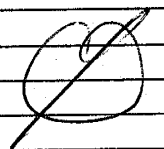
Plant Name	Check if invasive	Check if in Appendix I
Hordeum jubata		
Lepidium sp. Avena sp.	✓	
Malva parviflora	✓	
Total number of co-dominant species (A)	23	
Total number of co-dominant species that are invasive (B)	2	
Percent Invasion $[(B)/(A) \times 100]$ (enter here and use in Table 19)	67	
Total number of co-dominant species that are endemic (enter here and use in Table 20)	0	

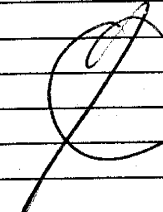
Wetland disturbances and conversions.

Has a major disturbance occurred at this wetland?	<u>Yes</u>	No		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	<u>other</u>
If yes, then how severe is the disturbance?	<u>likely to affect site next 5 or more years</u>	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type?	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	Lacustrine	seep or spring	playa	

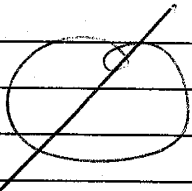
Repeated disturbance from vehicles using dirt road which encompasses a portion of the pool.

Worksheet 5: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	✓	
Predation and habitat destruction by non-native vertebrates (e.g., <i>Virginia opossum</i> and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources	✓	
Lack of treatment of invasive plants adjacent to AA or buffer	✓	
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
 Based on size of watershed of the pool, development should not have impact currently.		

Basic Information: Individual Vernal Pools

Which best describes the hydrologic state of the wetland at the time of assessment?

- ☒ ponded/inundated ☐ saturated soil, but no surface water ☐ dry

What is the apparent hydrologic regime of the wetland?

- ☐ long-duration ☐ medium-duration ☐ short-duration

Does the individual vernal pool connect with the floodplain of a nearby stream? ☐ yes ☒ no

photo 6 = P 2

Sally Tonke
Amy Mattson

Scoring Sheet: Individual Vernal Pools

AA Name: <u>Pine 2</u>			(m/d/y)	<u>02/27/11</u>	
Attributes and Metrics		Alpha.	Numeric	Comments	
Buffer and Landscape Context					
(A) Landscape Connectivity		<u>D</u>	<u>3</u>	<u>only vernal/road pools with 500m</u>	
(B): Percent of AA with Buffer	Alpha. <u>A</u>	Numeric <u>12</u>	<u>100% with buffer</u>		
(C): Average Buffer Width	<u>A</u>	<u>12</u>	<u>250m</u>		
(D): Buffer Condition	<u>C</u>	<u>6</u>	<u>non-native grassland & dirt road</u>		
Initial Attribute Score = $A + [D \times (B \times C)]^{1/2}$			<u>11.4</u>	Final Attribute Score = (Initial Score/24) x 100	<u>47.5</u>
Hydrology					
Water Source		<u>A</u>	<u>12</u>	<u>natural precipitation</u>	
Hydroperiod		<u>B</u>	<u>9</u>	<u>slightly deeper portions due to vehicle travel</u>	
Hydrologic Connectivity		<u>A</u>	<u>12</u>	<u>unrestricted</u>	
Initial Attribute Score			<u>33</u>	Final Attribute Score = (Initial Score/36) x 100	<u>91.7</u>
Physical Structure					
Structural Patch Richness		<u>C</u>	<u>6</u>	<u>very simple pool in rd.</u>	
Topographic Complexity		<u>D</u>	<u>3</u>	<u>no slope, road cuts</u>	
Initial Attribute Score			<u>9</u>	Final Attribute Score = (Initial Score/24) x 100	<u>37.5</u>
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. <u>C</u>	Numeric <u>6</u>	<u>3 spp.</u>		
Plant Community submetric B: Percent Invasion	<u>D</u>	<u>3</u>	<u>100%</u>		
Plant Community submetric C: Endemic Species Richness	<u>D</u>	<u>3</u>	<u>0 endemic</u>		
Plant Community Metric (average of submetrics A-C)			<u>4</u>		
Horizontal Interspersion and Zonation		<u>D</u>	<u>3</u>	<u>non-native grassland throughout</u>	
Initial Attribute Score			<u>7</u>	Final Attribute Score = (Initial Score/24) x 100	<u>29.2</u>
Overall AA Score (Average of Final Attribute Scores)				<u>51.5 = 52</u>	

205.9/4 ↑

Worksheet 1: Landscape Connectivity Metric for Individual Vernal Pools.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	45%
South	↓
East	
West	
Average Percent Crossing Aquatic Area for all Four Transects	

Worksheet 2: Calculating average buffer width of AA.

Transect	Buffer Width (m)
A	250m
B	↓
C	
D	
E	
F	
G	
H	
Average Buffer Width	250m

Worksheet 3: Structural Patch Type for Vernal Pool Systems.

Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for presence
Small individual pools	
Large individual pools	✓
Small swales	
Large swales	
More than 1 pool cluster (a set of 3 or more interconnected pools with nearest neighbors less than 5 m apart)	
Drainage branches (more than 1 drainage branch)	
Simply-shaped pools (mostly round or oval)	
Complexly-shaped pools (not mostly round or oval)	✓
Plant hummocks	✓
Mima mounds	
Animal burrows	
Bare soil	✓
Soil cracks	
Cobble	
Total Possible	14
No. Observed Patch Types (enter here and use in Table 15)	4

Worksheet 4a: Plant Community Metric –

Co-dominant Plant Species in Individual Vernal Pools.

Note: A dominant species represents $\leq 10\%$ *relative* cover. Count species only once when calculating any Plant Community sub-metric.

Co-dominant Species	
Total number of co-dominant species	3


Worksheet 4b: Plant Community Metric – List of Unique Co-dominant Plant Species in Individual Vernal Pool.


Plant Name	Check if invasive	Check if in Appendix I
Lolium (awn)	✓	
Avena barbate	✓	
Bromus diandrus	✓	
Total number of co-dominant species (A)	3	
Total number of co-dominant species that are invasive (B)	3	
Percent Invasion $[(B)/(A) \times 100]$ (enter here and use in Table 19)	100%	
Total number of co-dominant species that are endemic (enter here and use in Table 20)	0	

Wetland disturbances and conversions.

Has a major disturbance occurred at this wetland?	<u>Yes</u>	No		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	<u>other</u>
If yes, then how severe is the disturbance?	<u>likely to affect site next 5 or more years</u>	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type?	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	Lacustrine	seep or spring	playa	

Worksheet 5: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	✓	
Predation and habitat destruction by non-native vertebrates (e.g., <i>Virginia opossum</i> and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources	✓	
Lack of treatment of invasive plants adjacent to AA or buffer	✓	
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
<p>Based on size of watershed of the pool, development should not have current impacts.</p>		

Basic Information: Individual Vernal Pools

Which best describes the hydrologic state of the wetland at the time of assessment?

- ☒ ponded/inundated ☐ saturated soil, but no surface water ☐ dry

What is the apparent hydrologic regime of the wetland?

- ☐ long-duration ☐ medium-duration ☐ short-duration

Does the individual vernal pool connect with the floodplain of a nearby stream? ☐ yes ☒ no

Sally T
Amy M

photo 7 - P3

Scoring Sheet: Individual Vernal Pools

AA Name: <u>P-3</u>			(m/d/y)	<u>2/27/11</u>
Attributes and Metrics		Alpha.	Numeric	Comments
Buffer and Landscape Context				
(A) Landscape Connectivity		<u>D</u>	<u>3</u>	<u>only rd + VPs w/in 500m</u>
(B): Percent of AA with Buffer	Alpha. <u>A</u>	Numeric <u>12</u>	<u>100% buffer</u>	
(C): Average Buffer Width	<u>A</u>	<u>12</u>	<u>250m</u>	
(D): Buffer Condition	<u>C</u>	<u>6</u>	<u>NNG + dirt rds</u>	
Initial Attribute Score = $A + [D \times (B \times C)^{1/2}]^{1/2}$			<u>11.4</u>	Final Attribute Score = (Initial Score/24) x 100 <u>47.5</u>
Hydrology				
Water Source	<u>A</u>	<u>12</u>	<u>natural precip.</u>	
Hydroperiod	<u>B</u>	<u>9</u>	<u>slightly deeper portions due to vehicle traffic</u>	
Hydrologic Connectivity	<u>A</u>	<u>12</u>	<u>unrestricted</u>	
Initial Attribute Score			<u>33</u>	Final Attribute Score = (Initial Score/36) x 100 <u>91.7</u>
Physical Structure				
Structural Patch Richness	<u>D</u>	<u>3</u>	<u>very simple pool</u>	
Topographic Complexity	<u>D</u>	<u>3</u>	<u>no slope, road cuts</u>	
Initial Attribute Score			<u>6</u>	Final Attribute Score = (Initial Score/24) x 100 <u>25</u>
Biotic Structure				
Plant Community submetric A: Number of Co-dominant species	Alpha. <u>D</u>	Numeric <u>3</u>	<u>2 spp.</u>	
Plant Community submetric B: Percent Invasion	<u>D</u>	<u>3</u>	<u>100%</u>	
Plant Community submetric C: Endemic Species Richness	<u>D</u>	<u>3</u>	<u>0</u>	
Plant Community Metric (average of submetrics A-C)			<u>3</u>	
Horizontal Interspersion and Zonation	<u>BC</u>	<u>6</u>		
Initial Attribute Score			<u>9</u>	Final Attribute Score = (Initial Score/24) x 100 <u>37.5</u>
Overall AA Score (Average of Final Attribute Scores)				<u>201.7/4 = 50</u>

Worksheet 1: Landscape Connectivity Metric for Individual Vernal Pools.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	45%
South	↓
East	
West	
Average Percent Crossing Aquatic Area for all Four Transects	45%

Worksheet 2: Calculating average buffer width of AA.

Transect	Buffer Width (m)
A	>250m
B	↓
C	
D	
E	
F	
G	
H	↓
Average Buffer Width	250m

Worksheet 3: Structural Patch Type for Vernal Pool Systems.

Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for presence
Small individual pools	✓
Large individual pools	
Small swales	
Large swales	
More than 1 pool cluster (a set of 3 or more interconnected pools with nearest neighbors less than 5 m apart)	
Drainage branches (more than 1 drainage branch)	
Simply-shaped pools (mostly round or oval)	✓
Complexly-shaped pools (not mostly round or oval)	
Plant hummocks	
Mima mounds	
Animal burrows	
Bare soil	✓
Soil cracks	
Cobble	
Total Possible	14
No. Observed Patch Types (enter here and use in Table 15)	3

Worksheet 4a: Plant Community Metric –

Co-dominant Plant Species in Individual Vernal Pools.

Note: A dominant species represents $\geq 10\%$ *relative cover*. Count species only once when calculating any Plant Community sub-metric.

Co-dominant Species	
Total number of co-dominant species	2

Worksheet 4b: Plant Community Metric –


List of Unique Co-dominant Plant Species in Individual Vernal Pool.

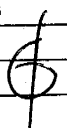
Plant Name	Check if invasive	Check if in Appendix I
Polygonum sp.	✓	
Sparganium sp.	✓	
Total number of co-dominant species (A)	2	
Total number of co-dominant species that are invasive (B)	2	
Percent Invasion $[(B)/(A) \times 100]$ (enter here and use in Table 19)	100%	
Total number of co-dominant species that are endemic (enter here and use in Table 20)	0	

Wetland disturbances and conversions.

Has a major disturbance occurred at this wetland?	Yes	No		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	other
If yes, then how severe is the disturbance?	likely to affect site next 5 or more years	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type?	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	Lacustrine	seep or spring	playa	

Worksheet 5: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	✓	
Predation and habitat destruction by non-native vertebrates (e.g., <i>Virginia opossum</i> and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources	✓	
Lack of treatment of invasive plants adjacent to AA or buffer	✓	
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
⊗		

Basic Information: Individual Vernal Pools

Which best describes the hydrologic state of the wetland at the time of assessment?

- ☒ ponded/inundated ☐ saturated soil, but no surface water ☐ dry

What is the apparent hydrologic regime of the wetland?

- ☐ long-duration ☐ medium-duration ☐ short-duration

Does the individual vernal pool connect with the floodplain of a nearby stream? ☐ yes ☒ no

P-4 = Photo 8

Sally T

Amy M

Scoring Sheet: Individual Vernal Pools

AA Name: <u>P-4</u>			(m/d/y)	<u>2/27/11</u>	
Attributes and Metrics		Alpha.	Numeric	Comments	
Buffer and Landscape Context					
(A) Landscape Connectivity		<u>D</u>	<u>3</u>	<u>only other VPs/rd pools</u>	
(B): Percent of AA with Buffer	Alpha. <u>A</u>	Numeric <u>12</u>	<u>100% buffer</u>		
(C): Average Buffer Width	<u>A</u>	<u>12</u>	<u>250m</u>		
(D): Buffer Condition	<u>C</u>	<u>6</u>	<u>NNG + dirt rds</u>		
Initial Attribute Score = $A + [D \times (B \times C)^{1/2}]^{1/2}$			<u>11.4</u>	Final Attribute Score = (Initial Score/24) x 100	<u>47.5</u>
Hydrology					
Water Source		<u>A</u>	<u>12</u>	<u>precip.</u>	
Hydroperiod		<u>B</u>	<u>9</u>	<u>vehicle traffic creates deeper pockets</u>	
Hydrologic Connectivity		<u>A</u>	<u>12</u>	<u>unrestricted</u>	
Initial Attribute Score			<u>33</u>	Final Attribute Score = (Initial Score/36) x 100	<u>91.7</u>
Physical Structure					
Structural Patch Richness		<u>C</u>	<u>6</u>	<u>mima mounds!</u>	
Topographic Complexity		<u>D</u>	<u>3</u>	<u>no slope/rd nets</u>	
Initial Attribute Score			<u>9</u>	Final Attribute Score = (Initial Score/24) x 100	<u>37.5</u>
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. <u>D</u>	Numeric <u>3</u>	<u>2 spp.</u>		
Plant Community submetric B: Percent Invasion	<u>D</u>	<u>3</u>	<u>100%</u>		
Plant Community submetric C: Endemic Species Richness	<u>D</u>	<u>3</u>	<u>0</u>		
Plant Community Metric (average of submetrics A-C)			<u>3</u>		
Horizontal Interspersion and Zonation		<u>C</u>	<u>6</u>	<u>small patches of bare dirt/deeper road not</u>	
Initial Attribute Score			<u>9</u>	Final Attribute Score = (Initial Score/24) x 100	<u>37.5</u>
Overall AA Score (Average of Final Attribute Scores)				<u>314.2/4 = 54</u>	

Worksheet 1: Landscape Connectivity Metric for Individual Vernal Pools.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	25%
South	↓
East	
West	
Average Percent Crossing Aquatic Area for all Four Transects	25%

Worksheet 2: Calculating average buffer width of AA.

Transect	Buffer Width (m)
A	250
B	↓
C	
D	
E	
F	
G	
H	↓
Average Buffer Width	250m

Worksheet 3: Structural Patch Type for Vernal Pool Systems.

Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for presence
Small individual pools	✓
Large individual pools	
Small swales	
Large swales	
More than 1 pool cluster (a set of 3 or more interconnected pools with nearest neighbors less than 5 m apart)	
Drainage branches (more than 1 drainage branch)	
Simply-shaped pools (mostly round or oval)	✓
Complexly-shaped pools (not mostly round or oval)	✓
Plant hummocks	✓
Mima mounds	✓
Animal burrows	
Bare soil	✓
Soil cracks	
Cobble	
Total Possible	14
No. Observed Patch Types (enter here and use in Table 15)	5

Worksheet 4a: Plant Community Metric –

Co-dominant Plant Species in Individual Vernal Pools.

Note: A dominant species represents $\geq 10\%$ *relative* cover. Count species only once when calculating any Plant Community sub-metric.

Co-dominant Species	
Total number of co-dominant species	2

Worksheet 4b: Plant Community Metric –


List of Unique Co-dominant Plant Species in Individual Vernal Pool.


Plant Name	Check if invasive	Check if in Appendix I
Lolium (awn)	✓	
Lepidium	✓	
Total number of co-dominant species (A)	2	
Total number of co-dominant species that are invasive (B)	2	
Percent Invasion $[(B)/(A) \times 100]$ (enter here and use in Table 19)	100%	
Total number of co-dominant species that are endemic (enter here and use in Table 20)	0	

Wetland disturbances and conversions.

Has a major disturbance occurred at this wetland?	<u>Yes</u>	No		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	<u>other</u>
If yes, then how severe is the disturbance?	<u>likely to affect site next 5 or more years</u>	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type?	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	Lacustrine	seep or spring	playa	

Worksheet 5: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	✓	
Predation and habitat destruction by non-native vertebrates (e.g., <i>Myiarchus cinerascens</i> and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources	✓	
Lack of treatment of invasive plants adjacent to AA or buffer	✓	
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pools

Which best describes the hydrologic state of the wetland at the time of assessment?

- ☒ ponded/inundated ☐ saturated soil, but no surface water ☐ dry

What is the apparent hydrologic regime of the wetland?

- ☐ long-duration ☐ medium-duration ☐ short-duration

Does the individual vernal pool connect with the floodplain of a nearby stream? ☐ yes ☒ no

Photo 9- P5

Sally T

Amy M

Scoring Sheet: Individual Vernal Pools

AA Name: <u>P-5</u>			(m/d/y)	<u>2/27/11</u>	
Attributes and Metrics		Alpha.	Numeric	Comments	
Buffer and Landscape Context					
(A) Landscape Connectivity		<u>D</u>	<u>3</u>	<u>only other rd/VPs</u>	
(B): Percent of AA with Buffer	Alpha. <u>A</u>	Numeric <u>12</u>	<u>100%</u>		
(C): Average Buffer Width	<u>B</u>	<u>9</u>	<u>184m</u>		
(D): Buffer Condition	<u>C</u>	<u>6</u>	<u>WVG + dirt rds</u>		
Initial Attribute Score $= A + [D \times (B \times C)^{1/2}]^{1/2}$ <u>$3 + [6 \times (12 \times 9)^{1/2}]^{1/2}$</u>			<u>10.9</u>	Final Attribute Score = (Initial Score/24) x 100	<u>45.4</u>
Hydrology					
Water Source		<u>A</u>	<u>12</u>	<u>natural precip.</u>	
Hydroperiod		<u>B</u>	<u>9</u>	<u>vehicle traffic creates deeper pocket</u>	
Hydrologic Connectivity		<u>A</u>	<u>12</u>	<u>unrestricted</u>	
Initial Attribute Score			<u>33</u>	Final Attribute Score = (Initial Score/36) x 100	<u>91.7</u>
Physical Structure					
Structural Patch Richness		<u>C</u>	<u>6</u>	<u>mima mounds</u>	
Topographic Complexity		<u>D</u>	<u>3</u>	<u>no complexity</u>	
Initial Attribute Score			<u>9</u>	Final Attribute Score = (Initial Score/24) x 100	<u>37.5</u>
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. <u>D</u>	Numeric <u>3</u>	<u>1 Sp.</u>		
Plant Community submetric B: Percent Invasion	<u>D</u>	<u>3</u>	<u>100%</u>		
Plant Community submetric C: Endemic Species Richness	<u>D</u>	<u>3</u>	<u>0</u>		
Plant Community Metric (average of submetrics A-C)		<u>D</u>	<u>3</u>		
Horizontal Interspersion and Zonation		<u>C</u>	<u>6</u>	<u>2 zones</u>	
Initial Attribute Score			<u>9</u>	Final Attribute Score = (Initial Score/24) x 100	<u>37.5</u>
Overall AA Score (Average of Final Attribute Scores)			<u>$212.1/4 = 53$</u>		

Worksheet 1: Landscape Connectivity Metric for Individual Vernal Pools.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	25%
South	1
East	
West	
Average Percent Crossing Aquatic Area for all Four Transects	25%

Worksheet 2: Calculating average buffer width of AA.

Transect	Buffer Width (m)
A	250
B	1
C	
D	
E	168
F	67
G	67
H	168
Average Buffer Width	184 m

Worksheet 3: Structural Patch Type for Vernal Pool Systems.

Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for presence
Small individual pools	
Large individual pools	✓
Small swales	
Large swales	
More than 1 pool cluster (a set of 3 or more interconnected pools with nearest neighbors less than 5 m apart)	
Drainage branches (more than 1 drainage branch)	
Simply-shaped pools (mostly round or oval)	
Complexly-shaped pools (not mostly round or oval)	✓
Plant hummocks	✓
Mima mounds	✓
Animal burrows	
Bare soil	✓
Soil cracks	
Cobble	
Total Possible	14
No. Observed Patch Types (enter here and use in Table 15)	5

Worksheet 4a: Plant Community Metric –

Co-dominant Plant Species in Individual Vernal Pools.

Note: A dominant species represents $\geq 10\%$ *relative* cover. Count species only once when calculating any Plant Community sub-metric.

Co-dominant Species	
Total number of co-dominant species	1

Worksheet 4b: Plant Community Metric –

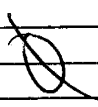
List of Unique Co-dominant Plant Species in Individual Vernal Pool.

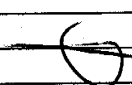
Plant Name	Check if invasive	Check if in Appendix I
Lolium	✓	
Total number of co-dominant species (A)	1	
Total number of co-dominant species that are invasive (B)	1	
Percent Invasion $[(B)/(A) \times 100]$ (enter here and use in Table 19)	100%	
Total number of co-dominant species that are endemic (enter here and use in Table 20)	0	

Wetland disturbances and conversions.

Has a major disturbance occurred at this wetland?	Yes	No		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	other
If yes, then how severe is the disturbance?	likely to affect site next 5 or more years	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type?	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	Lacustrine	seep or spring	playa	

Worksheet 5: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (PCOTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	✓	
Predation and habitat destruction by non-native vertebrates (e.g., <i>Virginia opossum</i> and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources	✓	
Lack of treatment of invasive plants adjacent to AA or buffer	✓	
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

EXT-1

Basic Information: Individual Vernal Pools

Which best describes the hydrologic state of the wetland at the time of assessment?

☒ ponded/inundated

☐ saturated soil, but no surface water

☐ dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration

☐ medium-duration

☐ short-duration

Does the individual vernal pool connect with the floodplain of a nearby stream? ☐ yes ☒ no

Sally Trnka
Erica Harris

photo 5 - EXT-1

Scoring Sheet: Individual Vernal Pools

AA Name: EXT - J		(m/d/y)	03/03/11	
Attributes and Metrics		Alpha.	Numeric	Comments
Buffer and Landscape Context				
(A) Landscape Connectivity		D	3	only vernal/road pools 100% wide buffer ↑ mng (mostly), but soils are undisturbed & little or no human visit.
(B): Percent of AA with Buffer	Alpha. A	Numeric 12		
(C): Average Buffer Width	A	12		
(D): Buffer Condition	B	9		
Initial Attribute Score = $A + [D \times (B \times C)^{1/2}]^{1/2}$			13.4	Final Attribute Score = (Initial Score/24) x 100
				56
Hydrology				
Water Source		A	12	precipitation only natural pattern of filling/drawdown unrestricted flow
Hydroperiod		A	12	
Hydrologic Connectivity		A	12	
Initial Attribute Score			36	Final Attribute Score = (Initial Score/36) x 100
				100
Physical Structure				
Structural Patch Richness		D	3	3 patch types mostly flat, some microtopo.
Topographic Complexity		D	3	
Initial Attribute Score			6	Final Attribute Score = (Initial Score/24) x 100
				25
Biotic Structure				
Plant Community submetric A: Number of Co-dominant species	Alpha. D	Numeric 3		2 species 100% 0
Plant Community submetric B: Percent Invasion	D	3		
Plant Community submetric C: Endemic Species Richness	D	3		
Plant Community Metric (average of submetrics A-C)				
Horizontal Interspersion and Zonation		D	3	uniform, flat
Initial Attribute Score			6	Final Attribute Score = (Initial Score/24) x 100
				25
Overall AA Score (Average of Final Attribute Scores)			206/4 = 52	

Worksheet 1: Landscape Connectivity Metric for Individual Vernal Pools.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	15
South	5
East	5
West	5
Average Percent Crossing Aquatic Area for all Four Transects	7.5

Worksheet 2: Calculating average buffer width of AA.

Transect	Buffer Width (m)
A	256
B	↓
C	
D	
E	
F	
G	
H	
Average Buffer Width	↓

Worksheet 3: Structural Patch Type for Vernal Pool Systems.

Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for presence
Small individual pools	✓
Large individual pools	
Small swales	
Large swales	
More than 1 pool cluster (a set of 3 or more interconnected pools with nearest neighbors less than 5 m apart)	
Drainage branches (more than 1 drainage branch)	
Simply-shaped pools (mostly round or oval)	
Complexly-shaped pools (not mostly round or oval)	✓
Plant hummocks	
Mima mounds	✓
Animal burrows	
Bare soil	
Soil cracks	
Cobble	
Total Possible	14
No. Observed Patch Types (enter here and use in Table 15)	3

Worksheet 4a: Plant Community Metric –

Co-dominant Plant Species in Individual Vernal Pools.

Note: A dominant species represents $\geq 10\%$ *relative cover*. Count species only once when calculating any Plant Community sub-metric.

Co-dominant Species	
Total number of co-dominant species	

Worksheet 4b: Plant Community Metric –

List of Unique Co-dominant Plant Species in Individual Vernal Pool.

Plant Name	Check if invasive	Check if in Appendix I
Avena sp.	✓	
Lolium sp.	✓	
Ery. avi present, but <10% relative cover		
Total number of co-dominant species (A)	2	
Total number of co-dominant species that are invasive (B)	100% 2	
Percent Invasion [(B)/(A) x 100] (enter here and use in Table 19)	100%	
Total number of co-dominant species that are endemic (enter here and use in Table 20)	0	

Wetland disturbances and conversions.

Has a major disturbance occurred at this wetland?	Yes	<u>No</u>		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	other
If yes, then how severe is the disturbance?	likely to affect site next 5 or more years	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type? <i>no</i>	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	lacustrine	seep or spring	playa	

Worksheet 5: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., <i>Virginia opossum</i> and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources	✓	
Lack of treatment of invasive plants adjacent to AA or buffer	✓	
Comments		
mostly nng in surroundings		
Eri Jan. would benefit from weeding		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pools

Which best describes the hydrologic state of the wetland at the time of assessment?

☒ ponded/inundated ☐ saturated soil, but no surface water ☐ dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration ☐ medium-duration ☐ short-duration

Does the individual vernal pool connect with the floodplain of a nearby stream? ☐ yes ☒ no

Sally Trnka
Erica Harris

photo 6 - EXT-2

Scoring Sheet: Individual Vernal Pools

AA Name: EXT-2			(m/d/y)	03/03/11
Attributes and Metrics		Alpha.	Numeric	Comments
Buffer and Landscape Context				
(A) Landscape Connectivity		D	3	only vernal/road pools
(B): Percent of AA with Buffer	Alpha. A	Numeric 12		100%
(C): Average Buffer Width	A	12		wide buffer
(D): Buffer Condition	B	9		↑ mg, but soils are not disturbed & little human visitation
Initial Attribute Score = $A + [D \times (B \times C)]$			13.4	Final Attribute Score = (Initial Score/24) x 100 56
Hydrology				
Water Source	A	12		precipitation only
Hydroperiod	A	12		natural pattern of filling/drawdown
Hydrologic Connectivity	A	12		unrestricted flow
Initial Attribute Score			36	Final Attribute Score = (Initial Score/36) x 100 100
Physical Structure				
Structural Patch Richness	D	3		3 patch types
Topographic Complexity	D	3		mostly flat, a little microtop.
Initial Attribute Score			6	Final Attribute Score = (Initial Score/24) x 100 25
Biotic Structure				
Plant Community submetric A: Number of Co-dominant species	Alpha. D	Numeric 3		1 species
Plant Community submetric B: Percent Invasion	D	3		100%
Plant Community submetric C: Endemic Species Richness	D	3		0 species endemic
Plant Community Metric (average of submetrics A-C)			3	
Horizontal Interspersion and Zonation			D	3 uniformly vegetated
Initial Attribute Score			6	Final Attribute Score = (Initial Score/24) x 100 25
Overall AA Score (Average of Final Attribute Scores)			206/4 = 52	

Worksheet 1: Landscape Connectivity Metric for Individual Vernal Pools.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	15
South	5
East	5
West	5
Average Percent Crossing Aquatic Area for all Four Transects	7.5

Worksheet 2: Calculating average buffer width of AA.

Transect	Buffer Width (m)
A	250
B	
C	
D	
E	
F	
G	
H	
Average Buffer Width	

Worksheet 3: Structural Patch Type for Vernal Pool Systems.

Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for presence
Small individual pools	
Large individual pools	✓
Small swales	
Large swales	
More than 1 pool cluster (a set of 3 or more interconnected pools with nearest neighbors less than 5 m apart)	
Drainage branches (more than 1 drainage branch)	
Simply-shaped pools (mostly round or oval)	
Complexly-shaped pools (not mostly round or oval)	✓
Plant hummocks	
Mima mounds	✓
Animal burrows	
Bare soil	
Soil cracks	
Cobble	
Total Possible	14
No. Observed Patch Types (enter here and use in Table 15)	3

Worksheet 4a: Plant Community Metric –

Co-dominant Plant Species in Individual Vernal Pools.

Note: A dominant species represents $\leq 10\%$ relative cover. Count species only once when calculating any Plant Community sub-metric.

Co-dominant Species	
Total number of co-dominant species	

Worksheet 4b: Plant Community Metric –

List of Unique Co-dominant Plant Species in Individual Vernal Pool.

Plant Name	Check if invasive	Check if in Appendix I
<i>Avena</i> sp.	✓	
<i>Eriogonum</i> sp. present, but $< 10\%$ relative cover		
Total number of co-dominant species (A)	1	
Total number of co-dominant species that are invasive (B)	1	
Percent Invasion $[(B)/(A) \times 100]$ (enter here and use in Table 19)	100%	
Total number of co-dominant species that are endemic (enter here and use in Table 20)	0	

Wetland disturbances and conversions.

Has a major disturbance occurred at this wetland?	Yes	<u>No</u>		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	other
If yes, then how severe is the disturbance?	likely to affect site next 5 or more years	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type? <u>NO</u>	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	Lacustrine	seep or spring	playa	

Worksheet 5: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, both)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., <i>Lynx baileyi</i> and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources	✓	
Lack of treatment of invasive plants adjacent to AA or buffer	✓	
Comments		
mostly mg in surroundings		
Eriaki would benefit from weeding		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pools

Which best describes the hydrologic state of the wetland at the time of assessment?

☒ ponded/inundated

☐ saturated soil, but no surface water

☐ dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration

☐ medium-duration

☐ short-duration

Does the individual vernal pool connect with the floodplain of a nearby stream? ☐ yes ☒ no

Sally Trnka

Erica Harris

photo # 708-EXT-3

Scoring Sheet: Individual Vernal Pools

AA Name: EXT-3			(m/d/y)	03/03/11
Attributes and Metrics		Alpha.	Numeric	Comments
Buffer and Landscape Context				
(A) Landscape Connectivity		D	3	only vernal/road pools
(B): Percent of AA with Buffer	Alpha. A	Numeric 12		100%
(C): Average Buffer Width	A	12		wide buffer
(D): Buffer Condition	B	9		covered with mgs, but soils are not disturbed & little human use.
Initial Attribute Score = $A + [D \times (B \times C)^{1/2}]^{1/2}$			13.4	Final Attribute Score = (Initial Score/24) x 100 56
Hydrology				
Water Source	A	12		precipitation only
Hydroperiod	A	12		natural pattern of filling/drawdown
Hydrologic Connectivity	A	12		unrestricted flow
Initial Attribute Score			36	Final Attribute Score = (Initial Score/36) x 100 100
Physical Structure				
Structural Patch Richness	D	3		3 patch types
Topographic Complexity	D	3		flat, little microtopography
Initial Attribute Score			6	Final Attribute Score = (Initial Score/24) x 100 25
Biotic Structure				
Plant Community submetric A: Number of Co-dominant species	Alpha. D	Numeric 3		2 species
Plant Community submetric B: Percent Invasion	D	3		100%
Plant Community submetric C: Endemic Species Richness	D	3		0 species
Plant Community Metric (average of submetrics A-C)			3	
Horizontal Interspersion and Zonation	D	3		uniformly vegetated
Initial Attribute Score			6	Final Attribute Score = (Initial Score/24) x 100 25
Overall AA Score (Average of Final Attribute Scores)			206/4 = 52	

Worksheet 1: Landscape Connectivity Metric for Individual Vernal Pools.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	15
South	5
East	5
West	5
Average Percent Crossing Aquatic Area for all Four Transects	7.5

Worksheet 2: Calculating average buffer width of AA.

Transect	Buffer Width (m)
A	250
B	↓
C	
D	
E	
F	
G	
H	
Average Buffer Width	↓

Worksheet 3: Structural Patch Type for Vernal Pool Systems.

Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for presence
Small individual pools	
Large individual pools	✓
Small swales	
Large swales	
More than 1 pool cluster (a set of 3 or more interconnected pools with nearest neighbors less than 5 m apart)	
Drainage branches (more than 1 drainage branch)	
Simply-shaped pools (mostly round or oval)	
Complexly-shaped pools (not mostly round or oval)	✓
Plant hummocks	
Mima mounds	✓
Animal burrows	
Bare soil	
Soil cracks	
Cobble	
Total Possible	14
No. Observed Patch Types (enter here and use in Table 15)	3

Worksheet 4a: Plant Community Metric –

Co-dominant Plant Species in Individual Vernal Pools.

Note: A dominant species represents $\geq 10\%$ *relative* cover. Count species only once when calculating any Plant Community sub-metric.

Co-dominant Species	
Total number of co-dominant species	

Worksheet 4b: Plant Community Metric –

List of Unique Co-dominant Plant Species in Individual Vernal Pool.

Plant Name	Check if invasive	Check if in Appendix I
<i>Avena</i> sp.	✓	
<i>Bromus</i> mad sp. rubens	✓	
Total number of co-dominant species (A)	2	
Total number of co-dominant species that are invasive (B)	2	
Percent Invasion $[(B)/(A) \times 100]$ (enter here and use in Table 19)	100%	
Total number of co-dominant species that are endemic (enter here and use in Table 20)	0	

Wetland disturbances and conversions.

Has a major disturbance occurred at this wetland?	Yes	<u>No</u>		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	other
If yes, then how severe is the disturbance?	likely to affect site next 5 or more years	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type? <u>no</u>	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	lacustrine	seep or spring	playa	

Worksheet 5: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., <i>Virginia opossum</i> and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources	✓	
Lack of treatment of invasive plants adjacent to AA or buffer	✓	
Comments		
mostly neg in surroundings		
Erica and would benefit from weeding		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pools

Which best describes the hydrologic state of the wetland at the time of assessment?

☒ ponded/inundated

☐ saturated soil, but no surface water

☐ dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration

☐ medium-duration

☒ short-duration

Does the individual vernal pool connect with the floodplain of a nearby stream? ☐ yes ☒ no

Sally Trnka
Amy Mattson

Photo 2 = Pool 1

Scoring Sheet: Individual Vernal Pools

AA Name: <u>Ref Pool 1</u>			(m/d/y)	<u>03/12/11</u>	
Attributes and Metrics		Alpha.	Numeric	Comments	
Buffer and Landscape Context					
(A) Landscape Connectivity		<u>D</u>	<u>3</u>	<u>only wetlands are vernal pools</u>	
(B): Percent of AA with Buffer	Alpha.	<u>A</u>	<u>12</u>	<u>100%</u>	
(C): Average Buffer Width	Alpha.	<u>A</u>	<u>12</u>	<u>250m</u>	
(D): Buffer Condition	Alpha.	<u>B</u>	<u>9</u>	<u>immediate vicinity high natives (restoration); to N is 1° NNG</u>	
Initial Attribute Score = $A + [D \times (B \times C)^{1/2}]^{1/2}$			<u>13.4</u>	Final Attribute Score = (Initial Score/24) x 100	<u>56</u>
Hydrology					
Water Source		<u>A</u>	<u>12</u>	<u>precipitation</u>	
Hydroperiod		<u>A</u>	<u>12</u>	<u>natural hydroperiod</u>	
Hydrologic Connectivity		<u>A</u>	<u>12</u>	<u>unrestricted flow</u>	
Initial Attribute Score			<u>36</u>	Final Attribute Score = (Initial Score/36) x 100	<u>100</u>
Physical Structure					
Structural Patch Richness		<u>D</u>	<u>3</u>	<u>3</u>	
Topographic Complexity		<u>C</u>	<u>6</u>	<u>one gentle slope</u>	
Initial Attribute Score			<u>9</u>	Final Attribute Score = (Initial Score/24) x 100	<u>38</u>
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha.	<u>D</u>	<u>3</u>	<u>2 co-dominants</u> <u>0 invasives</u>	
Plant Community submetric B: Percent Invasion	Alpha.	<u>A</u>	<u>12</u>		
Plant Community submetric C: Endemic Species Richness	Alpha.	<u>D</u>	<u>3</u>		
Plant Community Metric (average of submetrics A-C)			<u>6</u>	<u>2 endemics plus others</u> <u>>10% cover</u>	
Horizontal Interspersion and Zonation		<u>A</u>	<u>12</u>	<u>3 zones, concentric</u>	
Initial Attribute Score			<u>18</u>	Final Attribute Score = (Initial Score/24) x 100	<u>75</u>
Overall AA Score (Average of Final Attribute Scores)				<u>67</u>	

Worksheet 1: Landscape Connectivity Metric for Individual Vernal Pools.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	<5%
South	<5%
East	30%
West	<5%
Average Percent Crossing Aquatic Area for all Four Transects	11%

Worksheet 2: Calculating average buffer width of AA.

Transect	Buffer Width (m)
A	250m
B	"
C	"
D	"
E	"
F	"
G	"
H	"
Average Buffer Width	250m

Worksheet 3: Structural Patch Type for Vernal Pool Systems.

Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for presence
Small individual pools	
Large individual pools	✓
Small swales	
Large swales	
More than 1 pool cluster (a set of 3 or more interconnected pools with nearest neighbors less than 5 m apart)	
Drainage branches (more than 1 drainage branch)	
Simply-shaped pools (mostly round or oval)	✓
Complexly-shaped pools (not mostly round or oval)	
Plant hummocks	
Mima mounds	✓
Animal burrows	
Bare soil	
Soil cracks	
Cobble	
Total Possible:	14
No. Observed Patch Types (enter here and use in Table 15)	3

Worksheet 4a: Plant Community Metric –

Co-dominant Plant Species in Individual Vernal Pools.

Note: A dominant species represents $\leq 10\%$ *relative* cover. Count species only once when calculating any Plant Community sub-metric.

Co-dominant Species	
Total number of co-dominant species	

Worksheet 4b: Plant Community Metric –

List of Unique Co-dominant Plant Species in Individual Vernal Pool.

Plant Name	Check if invasive	Check if in Appendix I
<i>Psilocarphus brevissimus</i>		✓
<i>Fleocharis</i>		✓
Total number of co-dominant species (A)	2	
Total number of co-dominant species that are invasive (B)	0	
Percent Invasion $[(B)/(A) \times 100]$ (enter here and use in Table 19)	0	
Total number of co-dominant species that are endemic (enter here and use in Table 20)	2	

Wetland disturbances and conversions.

Has a major disturbance occurred at this wetland?	Yes	<u>No</u>		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	other
If yes, then how severe is the disturbance?	likely to affect site next 5 or more years	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type? <div align="right">NO</div>	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	lacustrine	seep or spring	playa	

Worksheet 5: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
N/A		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
N/A		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., <i>Lynx baileyi</i> and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
N/A		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
N/A		

Basic Information: Individual Vernal Pools

Which best describes the hydrologic state of the wetland at the time of assessment?

☒ ponded/inundated

☐ saturated soil, but no surface water

☐ dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration

☐ medium-duration

☒ short-duration

Does the individual vernal pool connect with the floodplain of a nearby stream? ☐ yes ☒ no

Sally Trnka
Amy Mattson

Pool 2 = Photo 3

Scoring Sheet: Individual Vernal Pools

AA Name: <u>Ref Pool 2</u>			(m/d/y)	<u>03/12/11</u>
Attributes and Metrics		Alpha.	Numeric	Comments
Buffer and Landscape Context				
(A) Landscape Connectivity		<u>D</u>	<u>3</u>	<u>only vernal pools</u>
(B): Percent of AA with Buffer	Alpha. <u>A</u>	Numeric <u>12</u>		<u>100%</u>
(C): Average Buffer Width	<u>A</u>	<u>12</u>		<u>250m</u>
(D): Buffer Condition	<u>B</u>	<u>9</u>		<u>immediate vicinity ↑ natives, restor. further N, NNG</u>
Initial Attribute Score = $A + [D \times (B \times C)^{1/2}]^{1/2}$			<u>13.4</u>	Final Attribute Score = (Initial Score/24) x 100 <u>56</u>
Hydrology				
Water Source		<u>A</u>	<u>12</u>	<u>precipitation</u>
Hydroperiod		<u>A</u>	<u>12</u>	<u>natural hydroperiod</u>
Hydrologic Connectivity		<u>A</u>	<u>12</u>	<u>unrestricted flow</u>
Initial Attribute Score			<u>36</u>	Final Attribute Score = (Initial Score/36) x 100 <u>100</u>
Physical Structure				
Structural Patch Richness		<u>C</u>	<u>6</u>	<u>5 types</u>
Topographic Complexity		<u>D</u>	<u>3</u>	<u>flat pool</u>
Initial Attribute Score			<u>9</u>	Final Attribute Score = (Initial Score/24) x 100 <u>38</u>
Biotic Structure				
Plant Community submetric A: Number of Co-dominant species	Alpha. <u>D</u>	Numeric <u>3</u>		<u>2 species</u>
Plant Community submetric B: Percent Invasion	<u>A</u>	<u>12</u>		<u>0%</u>
Plant Community submetric C: Endemic Species Richness	<u>D</u>	<u>3</u>		<u>2 endemics (+ others, < 10%)</u>
Plant Community Metric (average of submetrics A-C)			<u>6</u>	
Horizontal Interspersion and Zonation		<u>C</u>	<u>6</u>	<u>patches of P. grandis w/in P. bne</u>
Initial Attribute Score			<u>12</u>	Final Attribute Score = (Initial Score/24) x 100 <u>50</u>
Overall AA Score (Average of Final Attribute Scores)				<u>61</u>

Worksheet 1: Landscape Connectivity Metric for Individual Vernal Pools.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	45%
South	15%
East	35%
West	5%
Average Percent Crossing Aquatic Area for all Four Transects	15%

Worksheet 2: Calculating average buffer width of AA.

Transect	Buffer Width (m)
A	250m
B	"
C	↓
D	
E	
F	
G	
H	↓
Average Buffer Width	250m

Worksheet 3: Structural Patch Type for Vernal Pool Systems.

Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for presence
Small individual pools	
Large individual pools	✓
Small swales	
Large swales	
More than 1 pool cluster (a set of 3 or more interconnected pools with nearest neighbors less than 5 m apart)	
Drainage branches (more than 1 drainage branch)	
Simply-shaped pools (mostly round or oval)	
Complexly-shaped pools (not mostly round or oval)	✓
Plant hummocks	
Mima mounds	✓
Animal burrows	
Bare soil	
Soil cracks	✓
Cobble	✓
Total Possible:	14
No. Observed Patch Types (enter here and use in Table 15)	5

Worksheet 4a: Plant Community Metric –

Co-dominant Plant Species in Individual Vernal Pools.

Note: A dominant species represents $\leq 10\%$ relative cover. Count species only once when calculating any Plant Community sub-metric.

Co-dominant Species	
Total number of co-dominant species	

Worksheet 4b: Plant Community Metric –

List of Unique Co-dominant Plant Species in Individual Vernal Pool.

Plant Name	Check if invasive	Check if in Appendix I
<i>Pogogyne nudiuscula</i>		✓ (endemic)
<i>Psilocarphus brevissimus</i>		✓
Total number of co-dominant species (A)	2	
Total number of co-dominant species that are invasive (B)	0	
Percent Invasion $[(B)/(A) \times 100]$ (enter here and use in Table 19)	0%	
Total number of co-dominant species that are endemic (enter here and use in Table 20)	2	

Wetland disturbances and conversions.

Has a major disturbance occurred at this wetland?	Yes	<u>No</u>		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	other
If yes, then how severe is the disturbance?	likely to affect site next 5 or more years	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type? <div align="center">NO</div>	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	Lacustrine	seep or spring	playa	

Worksheet 5: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., <i>Virginia opossum</i> and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information: Individual Vernal Pools

Which best describes the hydrologic state of the wetland at the time of assessment?

☒ ponded/inundated

☐ saturated soil, but no surface water

☐ dry

What is the apparent hydrologic regime of the wetland?

☐ long-duration

☐ medium-duration

☒ short-duration

Does the individual vernal pool connect with the floodplain of a nearby stream? ☐ yes ☒ no

Sally Truke
Amy Mattson

Pool # 3 - Photo 4

Scoring Sheet: Individual Vernal Pools

AA Name: <u>Ref Pool 3 (#18)</u>			(m/d/y)	<u>03/12/11</u>	
Attributes and Metrics		Alpha.	Numeric	Comments	
Buffer and Landscape Context					
(A) Landscape Connectivity		<u>D</u>	<u>3</u>	<u>only vernal pools</u> <u>100%</u> <u>250m</u> <u>immediate vicinity restoration area</u>	
(B): Percent of AA with Buffer	Alpha. <u>A</u>	Numeric <u>12</u>			
(C): Average Buffer Width	<u>A</u>	<u>12</u>			
(D): Buffer Condition	<u>B</u>	<u>9</u>			
Initial Attribute Score = $A + [D \times (B \times C)^{1/2}]^{1/2}$			<u>13.4</u>	Final Attribute Score = (Initial Score/24) x 100	<u>56</u>
Hydrology					
Water Source		<u>A</u>	<u>12</u>	<u>precipitation</u>	
Hydroperiod		<u>A</u>	<u>12</u>	<u>natural hydroperiod</u>	
Hydrologic Connectivity		<u>A</u>	<u>12</u>	<u>unrestricted flow</u>	
Initial Attribute Score			<u>36</u>	Final Attribute Score = (Initial Score/36) x 100	<u>100</u>
Physical Structure					
Structural Patch Richness		<u>C</u>	<u>6</u>	<u>5 species</u>	
Topographic Complexity		<u>D</u>	<u>3</u>	<u>mostly flat</u>	
Initial Attribute Score			<u>9</u>	Final Attribute Score = (Initial Score/24) x 100	<u>38</u>
Biotic Structure					
Plant Community submetric A: Number of Co-dominant species	Alpha. <u>C</u>	Numeric <u>6</u>	<u>3 species</u> <u>0%</u> <u>3 species plus others <10%</u>		
Plant Community submetric B: Percent Invasion	<u>A</u>	<u>12</u>			
Plant Community submetric C: Endemic Species Richness	<u>C</u>	<u>6</u>			
Plant Community Metric (average of submetrics A-C)					
Horizontal Interspersion and Zonation		<u>B</u>	<u>9</u>	<u>2 wetter/deeper patches</u>	
Initial Attribute Score			<u>17</u>	Final Attribute Score = (Initial Score/24) x 100	<u>71</u>
Overall AA Score (Average of Final Attribute Scores)				<u>66</u>	

Worksheet 1: Landscape Connectivity Metric for Individual Vernal Pools.

Percentage of Each Transect Line Crossing Wetland or Other Aquatic Habitat	
Transect	Percent Crossing Aquatic Area
North	5%
South	<5%
East	20%
West	<5%
Average Percent Crossing Aquatic Area for all Four Transects	9%

Worksheet 2: Calculating average buffer width of AA.

Transect	Buffer Width (m)
A	250m
B	"
C	"
D	"
E	"
F	"
G	"
H	"
Average Buffer Width	250m

Worksheet 3: Structural Patch Type for Vernal Pool Systems.

Identify each type of patch that is observed in the AA and use the total number of observed patch types in Table 15. Patch type definitions are provided on the next page.

Structural Patch Type	Check for presence
Small individual pools	
Large individual pools	✓
Small swales	
Large swales	
More than 1 pool cluster (a set of 3 or more interconnected pools with nearest neighbors less than 5 m apart)	
Drainage branches (more than 1 drainage branch)	
Simply-shaped pools (mostly round or oval)	
Complexly-shaped pools (not mostly round or oval)	✓
Plant hummocks	
Mima mounds	✓
Animal burrows	
Bare soil	
Soil cracks	✓
Cobble	✓
Total Possible:	14
No. Observed Patch Types (enter here and use in Table 15)	5

Worksheet 4a: Plant Community Metric –

Co-dominant Plant Species in Individual Vernal Pools.

Note: A dominant species represents $\geq 10\%$ *relative* cover. Count species only once when calculating any Plant Community sub-metric.

Co-dominant Species	
Total number of co-dominant species	

Worksheet 4b: Plant Community Metric –

List of Unique Co-dominant Plant Species in Individual Vernal Pool.

Plant Name	Check if invasive	Check if in Appendix I	
<i>Psilocarphus brevissimus</i>		✓	
<i>Eryngium aristatum</i>		✓	
<i>Pogogyne nudiuscula</i>		✓	should be
Total number of co-dominant species (A)	3		
Total number of co-dominant species that are invasive (B)	0		
Percent Invasion $[(B)/(A) \times 100]$ (enter here and use in Table 19)	0%		
Total number of co-dominant species that are endemic (enter here and use in Table 20)	3		

Wetland disturbances and conversions.

Has a major disturbance occurred at this wetland?	Yes	<u>No</u>		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	other
If yes, then how severe is the disturbance?	likely to affect site next 5 or more years	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type? <div align="right">NO</div>	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	lacustrine	seep or spring	playa	

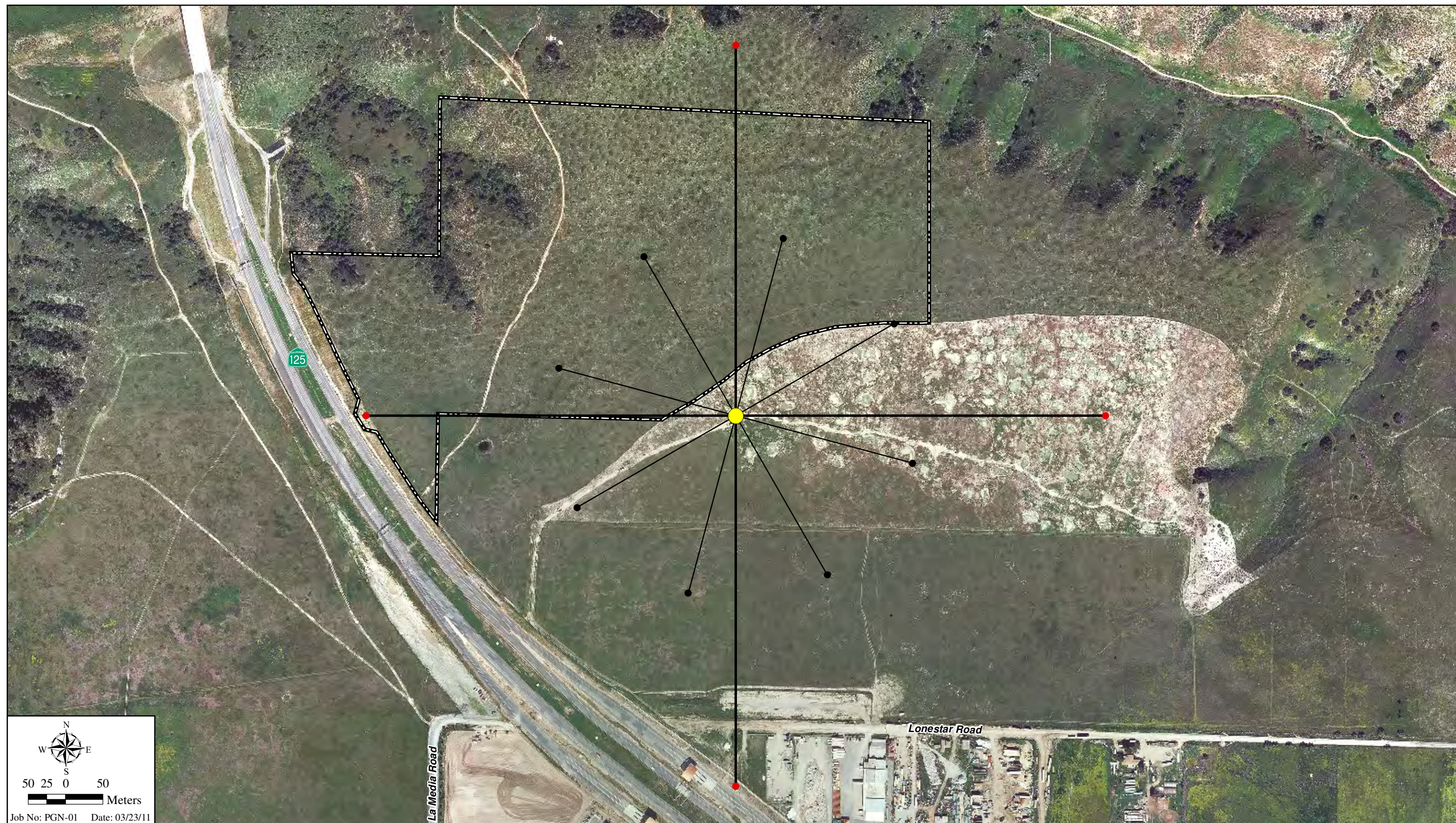
Worksheet 5: Stressor Checklist.

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		
N/A		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Filling or dumping of sediment or soils (N/A for restoration areas)		
Grading/ compaction (N/A for restoration areas)		
Plowing/Discing (N/A for restoration areas)		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		
N/A		

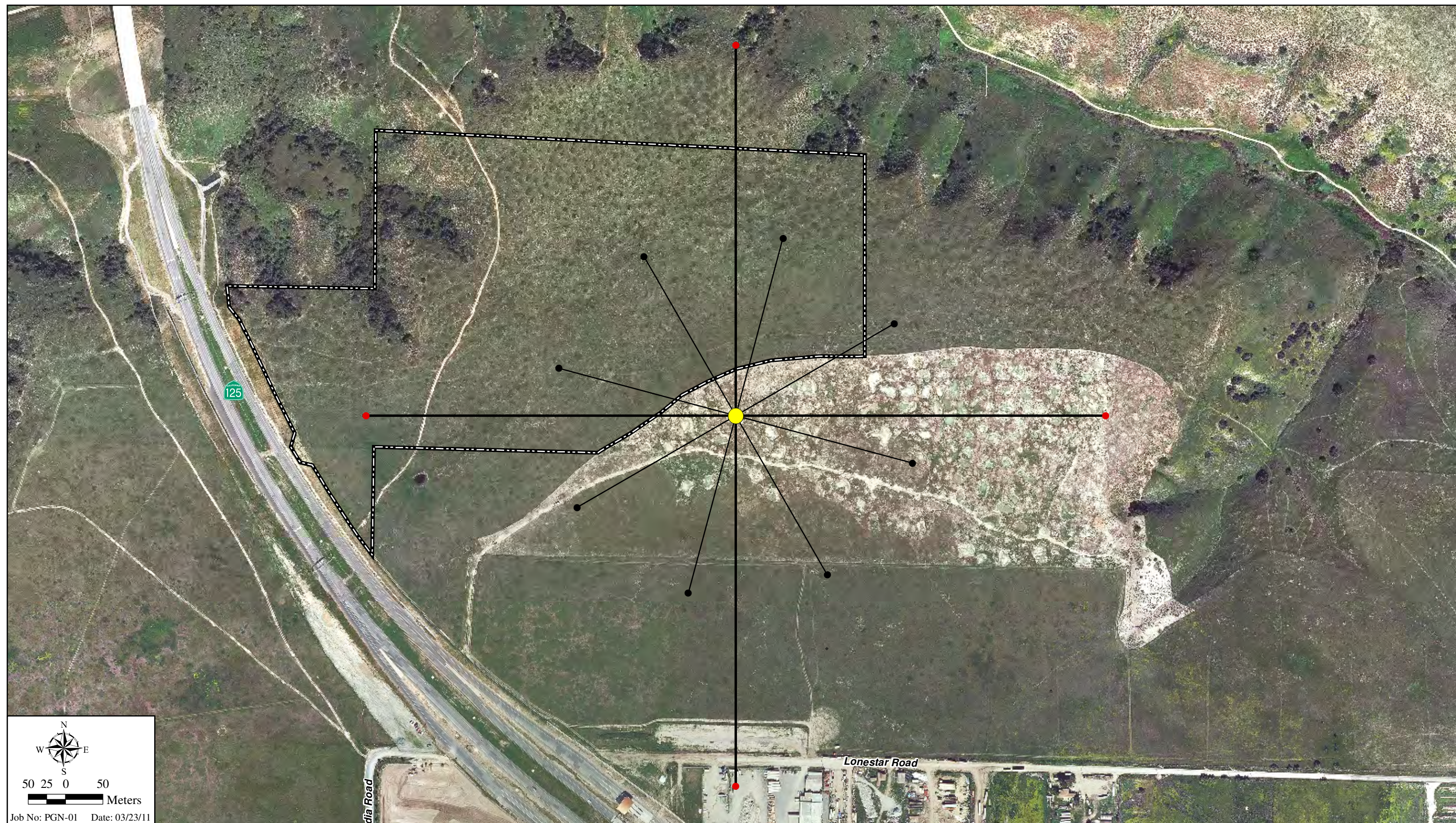
BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., <i>Unguis opossum</i> and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		
N/A		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present and likely to have negative effect on AA	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)		
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
N/A		



Reference Site - Pool 1 Buffer Analysis

VERNAL POOL PRESERVE RESTORATION PLAN FOR OTAY BUSINESS PARK

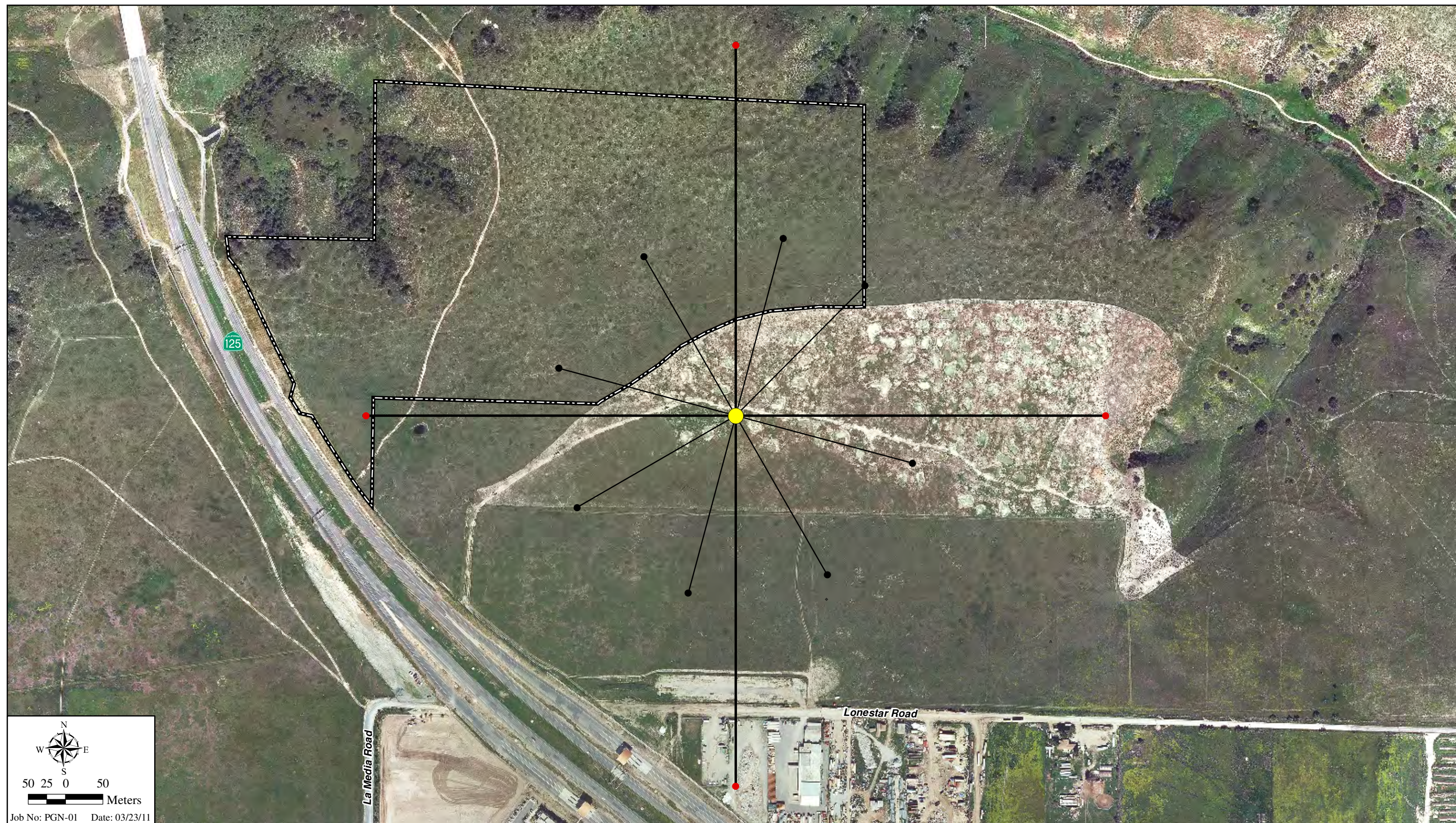


50 25 0 50
Meters
Job No: PGN-01 Date: 03/23/11

I:\ArcGIS\PGN-01 Armaiz\Map\BIO\CRAM\RefSite2_Analysis.mxd -KF

Reference Site - Pool 2 Buffer Analysis

VERNAL POOL PRESERVE RESTORATION PLAN FOR OTAY BUSINESS PARK



F:\ArcGIS\PGN-01 Armaiz\Map\BIO\CRAM\RefSite3_Analysis.mxd -KF

Reference Site - Pool 3 Buffer Analysis

VERNAL POOL PRESERVE RESTORATION PLAN FOR OTAY BUSINESS PARK

A blue decorative shape in the top right corner, consisting of a rectangle with a curved left edge tapering to a point.

Appendix I

OFF-SITE BIOLOGICAL OPEN SPACE AT LONESTAR RIDGE RESOURCE MANAGEMENT PLAN



Appendix I
OFF-SITE BIOLOGICAL OPEN SPACE AT LONESTAR RIDGE
RESOURCE MANAGEMENT PLAN

The following Resource Management Plan for Off-site Biological Open Space at Lonestar Ridge, dated October 17, 2011, was prepared for the approved Otay Business Park (OBP) project (TM 5505). The OBP project is situated adjacent to the proposed Hawano project and is anticipated to be constructed ahead of the Hawano project. If the Hawano project is implemented ahead of OBP, then Hawano will meet a portion of its mitigation requirements by implementing its respective portion of the OBP long-term management measures identified in the RMP, as described in Section 4.4 of the Biological Technical Report for the Hawano project.

Otay Business Park

Off-site Biological Open Space at Lonestar Ridge
Resource Management Plan
TM 5505

October 17, 2011



Greg Mason
County-approved Biological Consultant

Prepared for:
County of San Diego

Project Proponent:
Paragon Management Company, LLC.
4225 Executive Square, Suite 920
La Jolla, California 92037

Prepared by:
HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard, Suite 200
La Mesa, CA 91942

Otay Business Park Off-site Biological Open Space at Lonestar Ridge Resource Management Plan

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
1.0	INTRODUCTION	1
1.1	Purpose of Resource Management Plan	1
1.1.1	Conditions and/or Mitigation Measures that Require an RMP	2
1.1.2	Agency Review and Coordination	2
2.0	IMPLEMENTATION	2
2.1	Resource Manager Qualifications and Responsible Parties	2
2.2	Financial Responsibility/Mechanism	4
2.3	Conceptual Cost Estimate	4
2.4	Reporting Requirements	8
2.5	Memorandum of Agreement (MOA)	8
3.0	PROPERTY DESCRIPTION	9
3.1	Legal and Geographical Description	9
3.2	Environmental Setting	9
3.3	Uses of Plan Area	10
4.0	BIOLOGICAL RESOURCES – FUNCTIONS AND VALUES	10
4.1	Vegetation Communities	10
4.1.1	Vernal Pools/Basins with Fairy Shrimp	11
4.1.2	Diegan Coastal Sage Scrub (including Disturbed)	11
4.1.3	Non-native Grassland	11
4.2	Plant Species	12
4.2.1	Plant Species Correlation with Habitat within the BOS	12
4.2.2	Rare, Threatened, or Endangered Plant Species Present or Likely to Occur	12
4.2.3	Non-native and/or Invasive Plant Species	14
4.3	Wildlife Species	14
4.3.1	Wildlife Species Correlation with Habitat within the BOS	14
4.3.2	Rare, Threatened, or Endangered Wildlife	14
4.3.3	Non-native and/or Invasive Wildlife	15
4.4	Overall Biological and Conservation Value	15
4.5	Enhancement and Restoration Opportunities	15
4.6	Cultural Resources Description	16
4.6.1	Archaeological Resources	16
4.6.2	Native American Consultation	21
4.6.3	Historical Resources	21

TABLE OF CONTENTS (cont.)

<u>Section</u>	<u>Title</u>	<u>Page</u>
5.0	BIOLOGICAL ELEMENT GOALS	21
5.1	Biological Management Tasks.....	21
5.2	Adaptive Management	25
5.3	Operations, Maintenance, and Administration Tasks	25
	5.3.1 Goals.....	25
	5.3.2 Tasks.....	25
5.4	Management Constraints	27
5.5	Public Use Tasks.....	28
5.6	Fire Management Tasks.....	28
6.0	LIST OF PREPARERS.....	29
7.0	REFERENCES	03

LIST OF APPENDICES

<u>Letter</u>	<u>Title</u>
A	Plant Species Observed
B	Sensitive Plant Species with Potential to Occur
C	Animal Species Observed or Detected
D	Sensitive Animal Species with Potential to Occur
E	Explanation of Status Codes for Plant and Animal Species

LIST OF FIGURES

<u>Number</u>	<u>Title</u>	<u>Follows Page</u>
1	Regional Location Map	10
2	Project Location Map.....	10
3	Regional Context	10
4	Lonestar Mitigation Parcels	10

LIST OF TABLES

<u>Number</u>	<u>Title</u>	<u>Page</u>
1	Resource Management Tasks	5
2	Vegetation Communities within the BOS (Post-restoration)	10
3	Cultural Resources within Overall Lonestar Ridge Project Area	17
4	Blooming Periods/Survey Season for Sensitive Plant Species within the BOS	23

LIST OF ACRONYMS

AMSL	above mean sea level
BOS	Biological Open Space
Cal-IPC	California Invasive Plant Council
Caltrans	California Department of Transportation
CDFG	California Department of Fish and Game
CNDDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Corps	U.S. Army Corps of Engineers
County	County of San Diego
DPLU	Director of Planning and Land Use
DPR	Director of Parks and Recreation
DPW	Director of Public Works
EOMSP	East Otay Mesa Specific Plan
HELIX	HELIX Environmental Planning, Inc.
HOA	Homeowners Association
Lonestar Parcels	Lonestar Ranch Property
MHPA	Multi-Habitat Planning Area
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MSCP	Multiple Species Conservation Program
PAMA	Pre-Approved Mitigation Area
PAR	Property Analysis Record
QCB	Quino checkerspot butterfly
RMP	Resource Management Plan
RWQCB	Regional Water Quality Control Board
TM	Tentative Map
USFWS	U.S Fish and Wildlife Service

1.0 INTRODUCTION

This Resource Management Plan (RMP) has been prepared for the proposed 68.72-acre Otay Business Park Off-Site Biological Open Space (BOS) preserve at Lonestar Ridge in accordance with mitigation requirements identified in the Otay Business Park biological technical report prepared by HELIX Environmental Planning, Inc. (HELIX 2011a). This RMP provides direction for the permanent preservation and management of the BOS preserve in accordance with County of San Diego (County) regulations.

1.1 PURPOSE OF RESOURCE MANAGEMENT PLAN

The purpose of this RMP is to provide guidance to ensure preservation of existing and enhanced native habitats and long-term management of the BOS. This RMP:

1. Guides management of vegetation communities and habitats, plant and animal species, cultural resources, and programs described herein to protect and, where appropriate, enhance biological and cultural resources;
2. Serves as a descriptive inventory of vegetation communities and plant and animal species that occur within the BOS;
3. Serves as a descriptive inventory of archaeological and/or historical resources that occur within the BOS;
4. Establishes the baseline conditions from which adaptive management will be determined and success will be measured; and
5. Provides an overview of the operation, maintenance, administrative, and personnel requirements to implement management goals, and serves as a budget planning aid.

The details of this conceptual plan may be modified when the Final RMP is prepared and submitted to the County for approval. The County will review the Final RMP to ensure that it meets the specified Purpose and Objectives.

The Otay Business Park project site is a Tentative Map (TM) 5505 for land designated for Mixed Industrial use in Subarea 2 of the East Otay Mesa Specific Plan (EOMSP). The TM will subdivide the 161.6-acre property into 59 industrial lots, 2 detention basin lots (Detention Basins A and B), a 1-acre lot set aside for a sewer pump station, and approximately 8.90 acres provided as realigned drainage channel and on-site open space.

Project development would impact 175.31 acres including impacts to 0.24 acre of vernal/road pool, 0.01 acre of freshwater marsh, 0.19 acre of saltgrass grassland, 163.41 acres of non-native grassland, 10.19 acres of disturbed habitat, and 1.27 acres of developed land.

All the sensitive plants recorded on the project site will be impacted by the proposed development, including small-flowered morning-glory (*Convolvulus simulans*; 5 individuals), variegated dudleya (*Dudleya variegata*; approximately 3,465 individuals), San Diego button-celery (*Eryngium aristulatum* var. *parishii*; 3 individuals), San Diego barrel cactus (*Ferocactus viridescens*; 31 individuals), chocolate lily (*Fritillaria biflora*; 4 individuals), San Diego

marsh-elder (*Iva hayesiana*; 11 individuals), spreading navarretia (*Navarretia fossalis*; 3 individuals), and one location supporting ashy spike-moss (*Selaginella cinerascens*).

The project applicant proposes to impact all of the sensitive animal species recorded on the project site, including San Diego fairy shrimp (*Branchinecta sandiegonensis*), Riverside fairy shrimp (*Streptocephalus woottoni*), Quino checkerspot butterfly (*Euphydryas editha quino*; [QCB] 1 individual observed in 2005), western spadefoot (*Spea hammondi*; 1 individual on site and 1 off site), grasshopper sparrow (*Ammodramus savannarum*; 1 individual), golden eagle (*Aquila chrysaetos*; foraging habitat), burrowing owl (*Athene cunicularia*; 7 pairs and 163.53 acres of occupied habitat), northern harrier (*Circus cyaneus*; 1 individual), white-tailed kite (*Elanus leucurus*; 1 individual), California horned lark (*Eremophila alpestris*; 1 individual on site and 1 off site), and loggerhead shrike (*Lanius ludovicianus*; 1 individual). Off-site impacts to burrowing owl pairs will occur just off site to the north of the proposed project site.

Preservation of 68.72 acres within the Lonestar Ranch Property (Lonestar Parcels) is covered under this RMP. This land is mostly non-native grassland and is designated as San Diego Fairy Shrimp Critical Habitat. In addition, preservation of 8.90 acres will occur on the project site (HELIX 2011b) and 84.68 acres of preservation will occur off of Otay Mesa (RMP to be prepared).

1.1.1 Conditions and/or Mitigation Measures that Require an RMP

This RMP satisfies County requirements for public review of the project pursuant to the California Environmental Quality Act and conditions that will be part of the Resolution of Approval. This RMP is also being submitted to the U.S. Army Corps of Engineers (Corps) and Regional Water Quality Control Board (RWQCB) as part of the permit application package. Project conditions requiring this RMP include mitigation for impacts to drainages, non-native grasslands, sensitive plants (small-flowered morning-glory, variegated dudleya, San Diego button-celery, San Diego barrel cactus, chocolate lily, San Diego marsh-elder, and spreading navarretia), and sensitive animals (San Diego fairy shrimp, Riverside fairy shrimp, QCB, western spadefoot, grasshopper sparrow, golden eagle, burrowing owl, northern harrier, white-tailed kite, California horned lark, and loggerhead shrike).

1.1.2 Agency Review and Coordination

A copy of the final RMP will be submitted to the U.S Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) for approval.

2.0 IMPLEMENTATION

2.1 RESOURCE MANAGER QUALIFICATIONS AND RESPONSIBLE PARTIES

Proposed Resource Manager:

The resource manager shall be one of the following:

- Conservancy group
- Natural resources land manager
- Natural resources consultant
- County Department of Parks and Recreation
- County Department of Public Works
- Federal or State Wildlife Agency (U.S. Fish and Wildlife Service, California Department of Fish and Game)
- Federal Land Manager such as Bureau of Land Management
- City Land Managers, including but not limited to Department of Parks and Recreation, Watershed Management or Department of Public Works.

The resource manager shall be approved in writing by the Director of Planning and Land Use (DPLU), the Director of Public Works (DPW), or the Director of Parks and Recreation (DPR). Any change in the designated resource manager shall also be approved in writing by the approving director. Appropriate qualifications for resource managers include, but are not limited to:

- Ability to carry out habitat monitoring or mitigation activities;
- Fiscal stability, including preparation of an operational budget (using an appropriate analysis technique) for the management of this RMP;
- Have at least 1 staff member with a biological, ecological, or wildlife management degree from an accredited college or university, or have a Memorandum of Understanding (MOU) with a qualified person with such a degree;
- If cultural sites are present, have a cultural resource professional on staff or a MOU with cultural consultant; and
- Experience with habitat and cultural resource management in southern California.

Proposed Land Owner:

Fee title of all separate BOS may be held by the Homeowners Association (HOA), or transferred to the Resource Manager or other appropriate landowner (e.g., land trust, conservancy, or public agency).

All BOS and/or conservation easements must be recorded prior to initiation of project impacts. Management responsibility for the 68.72 acres of land dedicated as off-site BOS at Lonestar Ridge will begin upon completion of the Vernal Pool Preserve Restoration Plan for Otay Business Park (HELIX 2011c).

Proposed Easement Holder:

If the land is transferred in fee title to any non-governmental entity, a Biological Open Space Easement or Conservation Easement dedication must be recorded. This easement should include the County but may also include other appropriate responsible agencies as defined under Section 815 of the California Civil Code as a grantee or third-party beneficiary. If the land is transferred to the County or other public conservation entity, no easement dedication is necessary.

Restoration Entity:

If revegetation/restoration activities are required, management responsibility for the revegetation/restoration area shall remain with the restoration entity until restoration/revegetation is completed. Upon County/Agency acceptance of the revegetated/restored area, management responsibility for the revegetation/restoration area will be transferred to the resource manager according to the Vernal Pool Preserve Restoration Plan (HELIX 2011c).

2.2 FINANCIAL RESPONSIBILITY/MECHANISM

Acceptable financial mechanisms include the following:

- Special District. Formation of a Lighting and Landscape District or Zone, or Community Facility District as determined appropriate by the Director of DPLU, DPW or DPR. If the developer desires DPR to manage the land, the following criteria must be met:
 - a. The land must be located inside a Pre-Approved Mitigation Area (PAMA) or proposed PAMA, or otherwise deemed acceptable by DPR.
 - b. The land must allow for public access.
 - c. The land must allow for passive recreational opportunities such as a trails system.
- Endowment. A one-time non-wasting endowment, which is tied to the property, to be used by the resource manager to implement the RMP.
- Other acceptable types of mechanisms including annual fees, to be approved by the Director of DPLU, DPW or DPR.
- Transfer of ownership to existing entity (e.g. Borrego Foundation, Cleveland National Forest).

The project applicant is responsible for all RMP funding requirements, including direct funds to support the RMP start-up tasks as well as either an on-going funding source, or a one-time non-wasting endowment, which is tied to the property to fund long-term RMP implementation. It is currently anticipated that long-term management funding will be provided through an endowment provided by the project applicant. Start-up tasks include fence installation and posting of signage along the western boundary along State Route (SR)-125 and along the northern boundary of the 68.72-acre BOS parcel, as well as data base compilation for the BOS. Long-term tasks involve the management and maintenance of the preserve in perpetuity, including habitat monitoring and mapping, exotic species control, and general monitoring and

reporting. These habitat management tasks commence immediately upon completion of the Vernal Pool Preserve Restoration Plan for Otay Business Park (HELIX 2011c).

2.3 CONCEPTUAL COST ESTIMATE

A Property Analysis Record (PAR) and cost estimate will be prepared for the 68.72-acre BOS when a Resource Manager has been identified. Table 1 provides an estimate of time required for tasks.

Table 1 RESOURCE MANAGEMENT TASKS			
Check if applies	Tasks	Frequency (times per year)	Hours required per year*
BIOLOGICAL TASKS			
X	Baseline inventory of resources (if original inventory is over 5 years old)*	One time	8
X	Update biological mapping*	Once every 5 years	1
X	Update aerial photography	Once every 5 years	1
X	Removal of invasive species*	As needed; anticipated 2 times per year	100
X	Artificial burrow maintenance	One time	8
X	Predator control	As needed	16
N/A	Habitat Restoration / Installation	--	--
N/A	Habitat Restoration / Monitoring and Management	--	--
X	Poaching control	As needed	4
X	Species Surveys (include a separate line for each species)		
X	Sensitive Plant Species Monitoring	1 out of every 5 years	8
X	Coastal California gnatcatcher Surveys	2 out of every 5 years	14
X	Fairy Shrimp Surveys	2 out of every 5 years	20
	Species management (include a separate line for each specific task)		
X	Sensitive Plant Species	As needed	8
X	Coastal California gnatcatcher	As needed	8
X	Fairy Shrimp	As needed	8
N/A	Noise management, if required	--	--
X	For lands within the MSCP and outside PAMA, consult Table 3-5 of the MSCP Plan for required biological resource monitoring	As needed	8
	Other		--

**Table 1 (cont.)
RESOURCE MANAGEMENT TASKS**

Check if applies	Tasks	Frequency (times per year)	Hours required per year*
CULTURAL RESOURCES TASKS			
X	Monitoring	Quarterly	8
X	Stewardship	Quarterly	8
OPERATIONS, MAINTENANCE AND ADMINISTRATION TASKS			
X	Establish and maintain database and analysis of data	Annually	8
X	Write and submit annual report to County*	Annually	8
X	Review fees for County review of annual report*	Annually	4
X	Review and if necessary, update management plan*	Every 5 years	5
X	Install permanent signs	One time	16
X	Regular site check	Monthly	36
X	Replace signs	Every 5 years	8
X	Construct permanent fencing/gates	One time	40
X	Maintain permanent fencing/gates	As needed	8
X	Remove trash and debris*	Quarterly	16
X	Coordinate with DEH and Sheriff	As needed	4
X	Maintain access road	As needed	4
N/A	Install stormwater BMPs	--	--
N/A	Maintain stormwater BMPs	--	--
N/A	Restore Built Structure	--	--
N/A	Maintain Built Structure	--	--
N/A	Maintain regular office hours	--	--
N/A	Inspect and service heavy equipment and vehicles	--	--
N/A	Inspect and repair buildings, residences and structures	--	--
N/A	Inspect and maintain fuel tanks	--	--
N/A	Coordinate with utility providers and easement holders	--	--
N/A	Manage hydrology (as required)	--	--
X	Coordinate with law enforcement and emergency services (e.g., fire)	As needed	4

**Table 1 (cont.)
RESOURCE MANAGEMENT TASKS**

Check if applies	Tasks	Frequency (times per year)	Hours required per year*
OPERATIONS, MAINTENANCE AND ADMINISTRATION TASKS (cont.)			
X	Coordinate with adjacent land managers	As needed	4
X	Remove graffiti and repair vandalism	Quarterly	16
X	Maintain Confidentiality of Cultural Site Locations	Ongoing	4
N/A	Other	--	--
PUBLIC USE TASKS			
N/A	Construct trail(s)	N/A	--
N/A	Monitor, maintain/repair trails	N/A	--
N/A	Control public access	N/A	--
N/A	Provide Ranger patrol	N/A	--
N/A	Provide visitor/interpretive services	N/A	--
N/A	Manage fishing and/or hunting program	N/A	--
N/A	Provide Neighbor Education - Community Partnership	N/A	--
N/A	Prepare and reproduce trail maps and interpretative materials.	N/A	--
N/A	If HOA or similar is funding management, provide annual presentation to HOA	N/A	--
N/A	Coordinate volunteer services	N/A	--
N/A	Provide emergency services access/ response planning	N/A	--
N/A	Other	N/A	--
FIRE MANAGEMENT TASKS			
X	Coordinate with applicable fire agencies and access (gate keys, etc.) for these agencies	As needed	8
N/A	Plan fire evacuation for public use areas	--	--
N/A	Protect areas with high biological importance	--	--
N/A	Hand-clear vegetation	--	--
N/A	Mow vegetation	--	--

Table 1 (cont.) RESOURCE MANAGEMENT TASKS			
Check if applies	Tasks	Frequency (times per year)	Hours required per year*
POST-FIRE TASKS			
N/A	Control post-fire erosion	--	--
N/A	Remove post-fire sediment	--	--
N/A	Reseed after fire	--	--
N/A	Replant after fire	--	--
	TOTAL	--	377

*Hours and costs to be determined by Resource Manager and depicted in the PAR

2.4 REPORTING REQUIREMENTS

An RMP Annual Report will be submitted to the County (and resource agencies, as applicable), along with the submittal fee to cover County staff review time. Annual reports shall discuss the previous year's management and monitoring as well as management/monitoring anticipated for the upcoming year. The Annual Report shall provide a concise but complete summary of management and monitoring methods, identify any new management issues, and address the success or failure of management approaches (based on monitoring). The report shall include a summary of changes from baseline or previous year conditions for species and habitats, and address any monitoring and management limitations, including weather (e.g., drought). The report shall also address any management (changes) resulting from previous monitoring results and provide a methodology for measuring the success of adaptive management. For new sensitive species observations or significant changes to previously reported species, the annual report shall include copies of completed California Natural Diversity Database (CNDDDB) forms with evidence that they have been submitted to the State. The report shall also include copies of invasive plant species forms submitted to the State or County.

A fee will be collected by DPLU upon submittal of the Annual Report for staff's review time. The RMP may also be subject to an ongoing deposit account for staff to address management challenges as they arise. Deposit accounts, if applicable, are replenished to a defined level as necessary.

2.5 MEMORANDUM OF AGREEMENT (MOA)

For RMPs associated with discretionary projects, the County will require a Memorandum of Agreement (MOA) with the applicant. The agreement will be executed when the County accepts the final RMP. The MOA will state that the applicant agrees to implement the RMP and provide perpetual funding. The MOA shall also provide a mechanism for the funds to transfer to the County in the event of the failure of the resource manager to meet the goals of the RMP. The MOA will specify that RMP funding or funding mechanism be established prior to the following milestones:

- For subdivisions, prior to the approval of grading or improvement plans, or prior to approval of the Parcel/Final Map, whichever is first;
- For permits, prior to construction or use of the property in reliance on the permit.

3.0 PROPERTY DESCRIPTION

3.1 LEGAL AND GEOGRAPHICAL DESCRIPTION

The Otay Business Park off-site BOS at Lonestar Ridge is located in the southern portion of San Diego County, north of SR-905 (Figure 1) and directly east of SR-125. Lonestar Ridge is located on 272.7 acres (excluding SR-125 lands) within the City of San Diego south of the Otay River Valley, northeast of Brown Field Airport (Figure 2). The northern boundary of the site is also the boundary separating the site from the City of Chula Vista and County. The BOS consists of 68.72 acres in the northern portion of the overall Lonestar Ridge property, east of SR-125, and occupies portions of Sections 22, 23, and 27 in Township 18 South, Range 1 West of the U.S. Geological Survey 7.5-minute Otay Mesa quadrangle (Figure 2). The BOS consists of all or part of the following Assessor's Parcel Numbers: 646-030-25, 646-030-26, 646-020-13, and 646-060-08 (Figure 2).

The majority of the site is on a relatively flat mesa with portions dropping off into Johnson Canyon on the south side of the Otay River Valley (Figure 2). Elevations range from approximately 380 feet above mean sea level (AMSL) at points along the side slopes of Johnson Canyon to approximately 530 feet AMSL on the mesa top. Access to the site will be ensured through an access easement covering adjacent preserved lands.

The BOS is located within the City of San Diego's Multi-Habitat Planning Area (MHPA; Figure 3). Land north of the BOS is within the County of San Diego's Multiple Species Conservation Program (MSCP) Preserve.

3.2 ENVIRONMENTAL SETTING

The vast majority of the site has been subject to cattle grazing, while various crops and orchards were planted on the southern portion of the site in the mid 1900s. There are no existing structures on site. Land uses in the surrounding area include Brown Field Airport to the southwest, industrial uses to the south, and the R.J. Donovan State Prison and George F. Bailey County Correctional Facility to the east. The residential areas of Otay Ranch are located just north of the MSCP open space and Otay River Valley. The SR-125 corridor is located immediately west of the BOS (Figure 3).

The BOS is located in the Peninsular Range Geomorphic Province of southern California. Soils within the BOS include Olivenhain cobbly loam and Stockpen gravelly clay loam (Bowman 1973). The clay loam soils generally tend to support rare and sensitive plants.

The climate in San Diego County is generally mild and arid. Temperatures in Otay Mesa are generally highest in September (mean high temperatures are 79°F) and lowest in December (mean low temperatures are 45°F). Average annual precipitation in the Otay Mesa is approximately 9.9 inches, with the highest average rainfall totals occurring in January and February (1.99 inches) and March (2.07 inches). The driest months are June, July, and August with approximately 0.08, 0.03, and 0.08 inch of rainfall per month, respectively (Weather.com 2008).

The site is located within the Otay Valley Hydrologic Area of the Otay Hydrologic Unit. No drainages occur within the BOS.

The rate of fires in San Diego County coastal shrublands generally increased over the last half of the 20th century. Over 600 fires have occurred in the foothills and mountains of San Diego County between 1910 and 1999, and several major fires in excess of 50,000 acres have occurred in recent years, likely as a result of drought conditions. The BOS did not burn in the 2003 or 2007 fires, or in recent preceding years.

3.3 USES OF PLAN AREA

The BOS would be used as mitigation for the proposed project. No trails or other public facilities are proposed within the BOS and no trails are proposed.

No easements issued to others exist within or across the BOS.

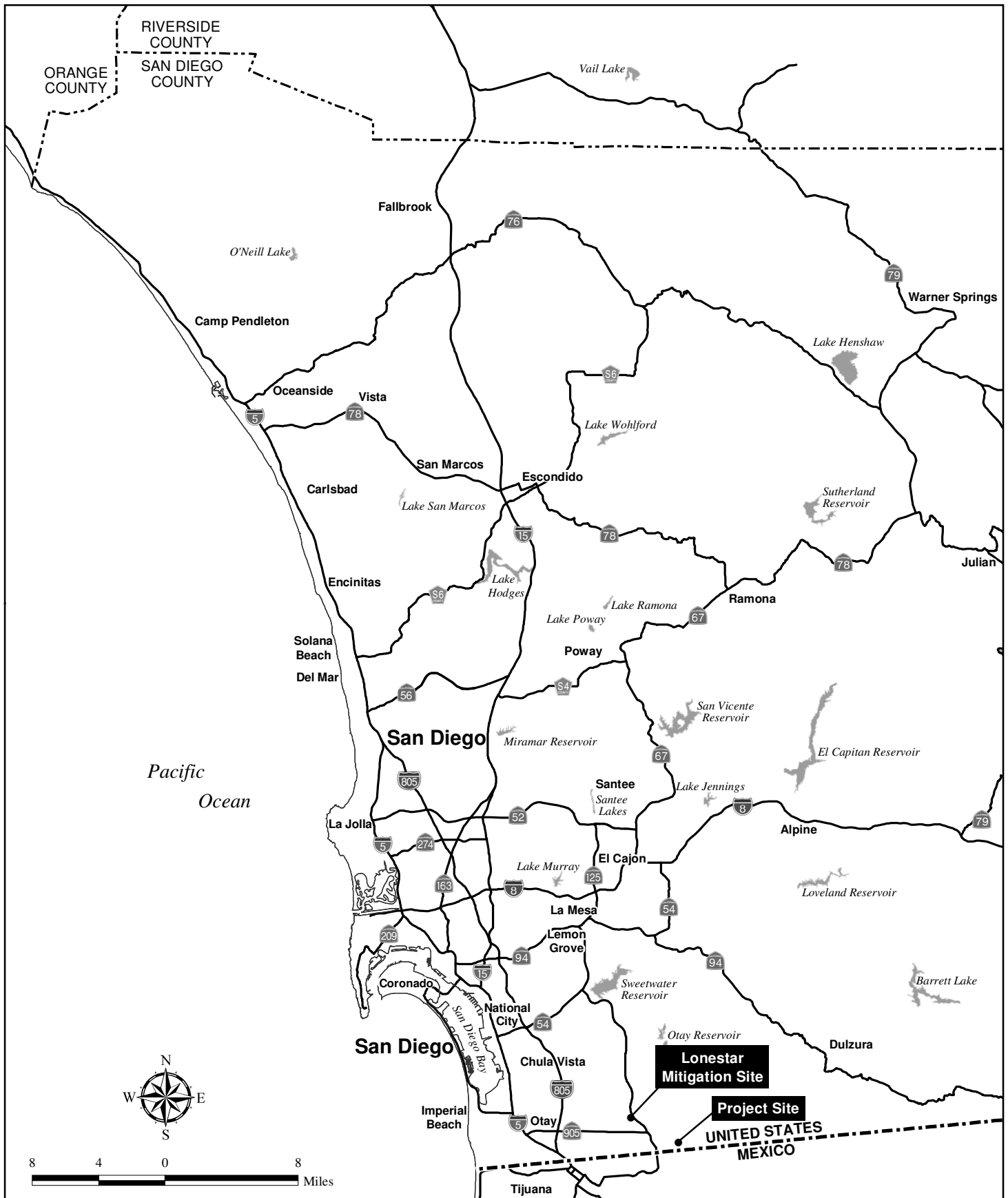
4.0 BIOLOGICAL RESOURCES – FUNCTIONS AND VALUES

4.1 VEGETATION COMMUNITIES

Three vegetation communities occur within the BOS: vernal pool (including basins with fairy shrimp), Diegan coastal sage scrub, and non-native grassland (Table 2; Figure 4). Refer to the Biological Resources Report prepared by HELIX (2011b) for more information.

Table 2 VEGETATION COMMUNITIES WITHIN THE BOS (POST-RESTORATION)	
Vegetation Community/Habitat	Acre(s)
Vernal pool/Basins with Fairy Shrimp (44320)	1.14
Diegan coastal sage scrub (including disturbed; 32500)	11.38
Non-native grassland (42220)	56.20
TOTAL	68.72

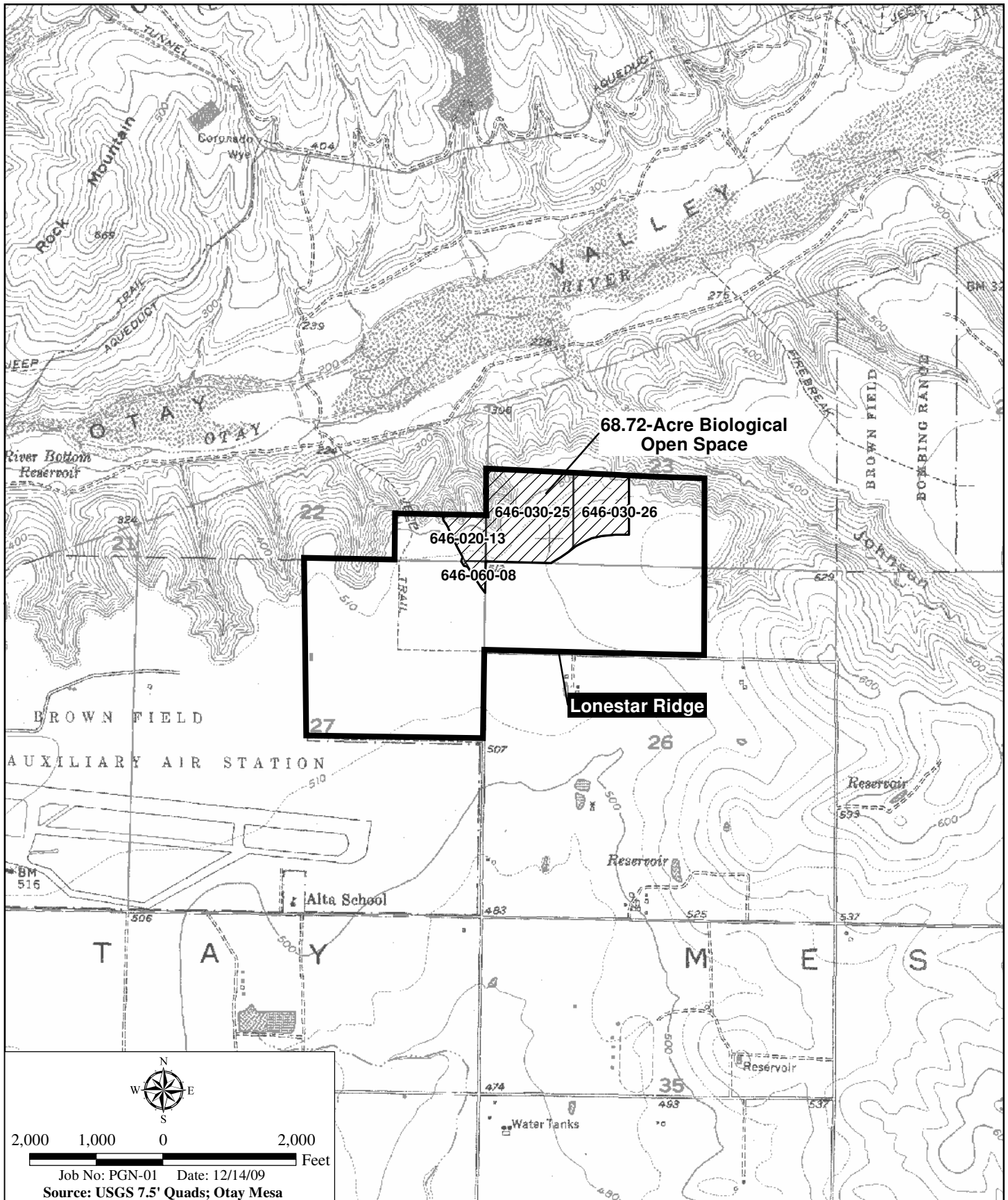
*Vegetation categories and numerical codes are from Holland (1986) and Oberbauer (2008)



Regional Location Map

RESOURCE MANAGEMENT PLAN FOR OTAY BUSINESS PARK OFF-SITE BIOLOGICAL OPEN SPACE AT LONESTAR RIDGE

Figure 1

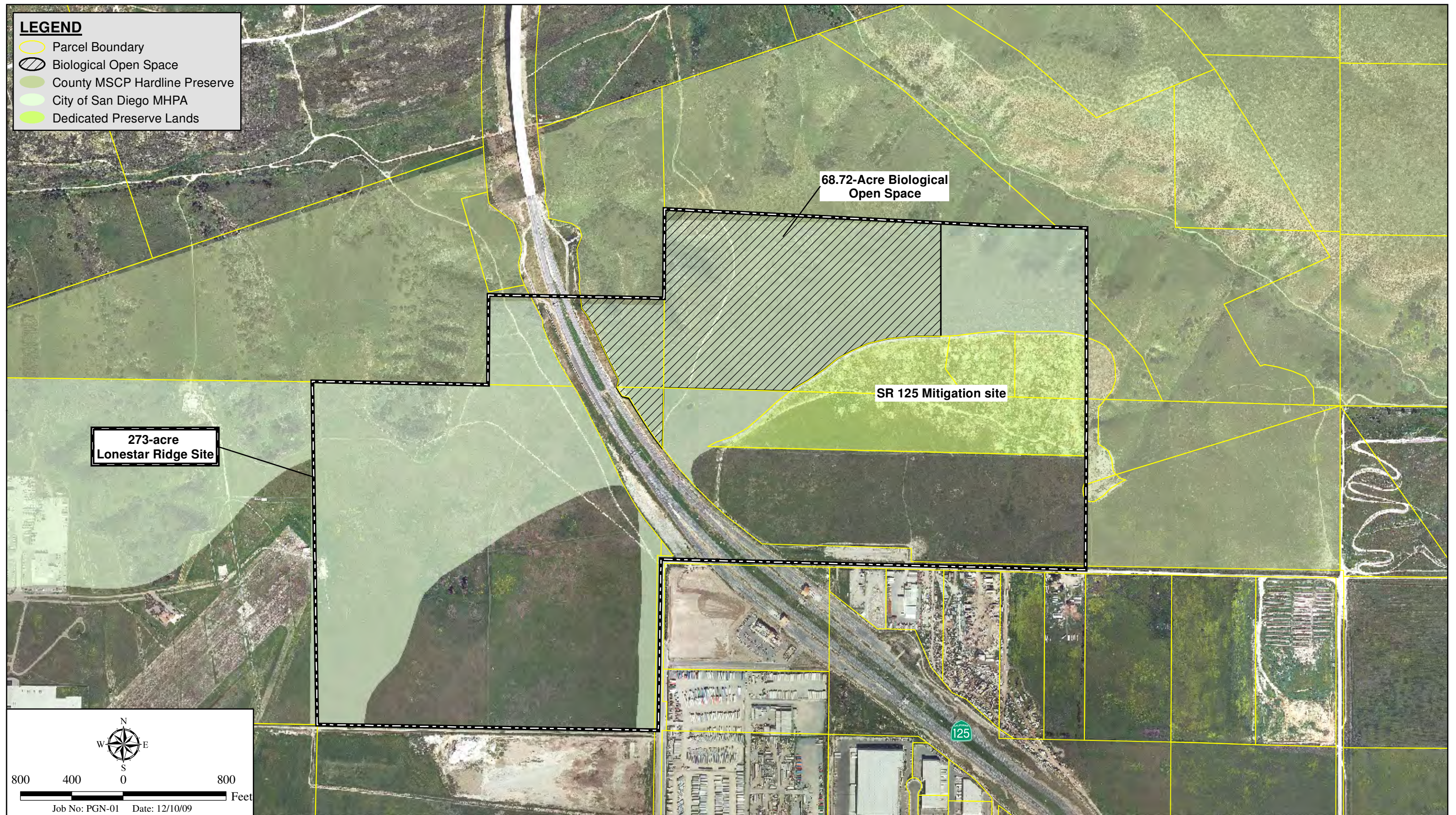


I:\ArcGIS\PPGN-01 Armaiz\Map\BIO\RMPO\Offsite\Fig2_Location.mxd -NM

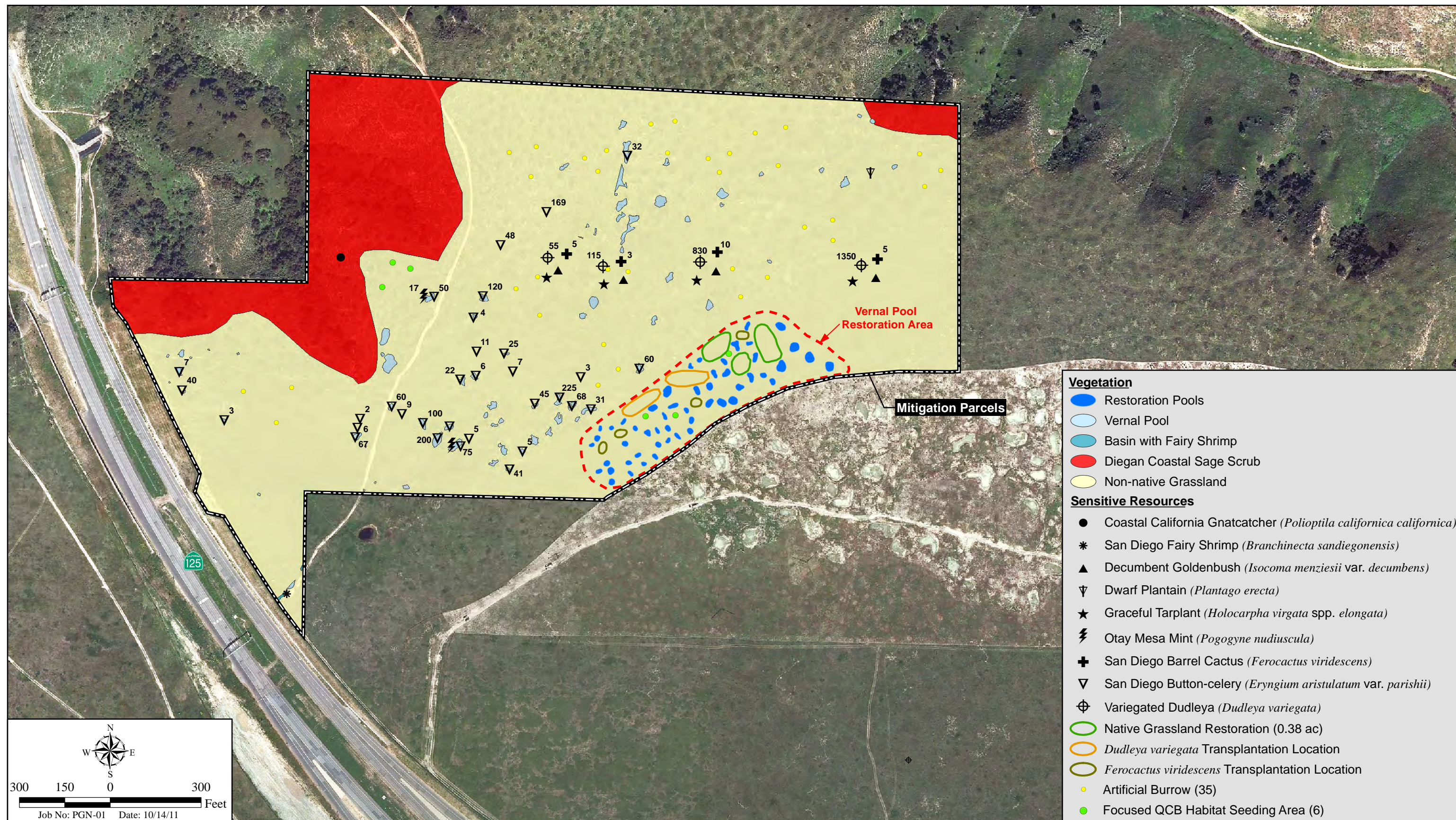
Project Location Map

RESOURCE MANAGEMENT PLAN FOR OTAY BUSINESS PARK
OFF-SITE BIOLOGICAL OPEN SPACE AT LONESTAR RIDGE

Figure 2



E:\ArcGIS\PGN-01_Amair\Map\BIO\RMP\Offsite\Fig3_Aerial.mxd -NM



Lonestar Mitigation Parcels

RESOURCE MANAGEMENT PLAN FOR OTAY BUSINESS PARK
OFF-SITE BIOLOGICAL OPEN SPACE AT LONESTAR RIDGE

Figure 4

4.1.1 Vernal Pools/Basins with Fairy Shrimp

Vernal pools, a highly specialized habitat supporting a unique flora and fauna, are associated with 2 important physical conditions on Otay Mesa: a subsurface claypan that inhibits the downward percolation of water and topography characterized by a series of low hummocks (mima mounds) and depressions (vernal pools). These 2 physical conditions allow water to collect in the depressions during the rainy season, which gradually evaporates. As water evaporates, a gradient of low soil water availability to high soil water availability is created from the periphery of the pool margins to the center of the pool. The chemical composition of the remaining pool water becomes more concentrated as water evaporates, creating a gradient of low ion concentration at the pool periphery to high ion concentration at the pool center. A temporal succession of plant species occurs at the receding pool margins, depending on physical and chemical microenvironmental pool characteristics. Vernal pools in a wet year will have a high proportion of native species endemic to this habitat. During these years, exotic ruderal species characteristic of non-native grasslands that occur on the surrounding mima mounds will not invade these pools, as they are unable to tolerate the physiological conditions. In years of scarce rainfall insufficient to saturate the soil and create a surface pool, native endemic flora will not germinate, and the pool will be invaded by exotic species.

A total of 80 vernal pools were identified within the BOS by HELIX during surveys conducted between 2003 and 2008, representing approximately 0.65 acre. The vernal pools on Lonestar Ridge are part of the J23 through J31 series originally identified by Bauder (1986). Some depressions (unvegetated basins) found within the BOS do not contain any vernal pool plant indicator species, but do contain the federally endangered San Diego or Riverside fairy shrimp. One basin with fairy shrimp totaling 0.01 acre occurs within the BOS. Vernal pools on site have been degraded by past agricultural activities. Most of the vernal pools within the BOS have a high composition of non-native grasses and forbs and generally only support 1 or 2 vernal pool indicator plant species. In addition, on-site vernal pool restoration would restore 0.48 acre of vernal pools within the Lonestar BOS. As such, a total of 1.14 acres of vernal pools will occur within the BOS following restoration.

4.1.2 Diegan Coastal Sage Scrub (including disturbed)

Coastal sage scrub is 1 of the 2 major shrub types that occur in California. This habitat type occupies xeric sites characterized by shallow soils. Sage scrub is dominated by subshrubs whose leaves abscise during drought. The Diegan coastal sage scrub within the BOS supports several plant species including lemonadeberry (*Rhus integrifolia*), California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), and various flowering annuals. Diegan coastal sage scrub occurs on the canyon slopes and covers 11.38 acres of the BOS. This habitat is of low to moderate quality, with sparsely spaced native shrubs and an herbaceous layer supporting native and non-native grasses and forbs.

4.1.3 Non-native Grassland

Non-native grassland areas may have supported native grassland in the past, but have been overrun by exotic, introduced annuals. The flora of non-native grasslands includes a dense to sparse cover

of introduced grasses and often numerous species of showy-flowered, native, annual forbs (Holland 1986). Characteristic species of the non-native grassland within the BOS include oats (*Avena* spp.), red brome (*Bromus madritensis* ssp. *rubens*), ripgut (*Bromus diandrus*), ryegrass (*Lolium* sp.), and mustard (*Brassica* sp.), as well as numerous native annuals such as blue-eyed grass (*Sisyrinchium bellum*), Fremont's camas (*Zigadenus fremontii*), goldfields (*Lasthenia californica*), popcorn flower (*Cryptantha* sp.), blue dicks (*Dichelostemma capitatum*), dwarf plantain (*Plantago erecta*), purple owl's-clover (*Castilleja exserta*), onion (*Allium* sp.), checker-bloom (*Sidalcea malviflora*), small-flower soap-plant (*Chlorogalum parviflorum*), as well as San Diego barrel cactus. A total of 56.20 acres of non-native grassland will occur within the BOS following vernal pool restoration.

4.2 PLANT SPECIES

4.2.1 Plant Species Correlation with Habitat within the BOS

A total of 106 plant species were observed on the 273-acre Lonestar Ridge property during the 2003 and 2005 rare plant surveys as well as during other biological surveys conducted between 2002 and 2008 (Appendix A), the majority of which have potential to occur within the 68.72-acre BOS.

4.2.2 Rare, Threatened, or Endangered Plant Species Present or Likely to Occur

Six (6) sensitive plant species were observed during biological surveys within the BOS, including 2 federally and state listed endangered species (San Diego button-celery [*Eryngium aristulatum* var. *parishii*] and Otay mesa mint (*Pogogyne nudiuscula*)). All 6 species observed are considered sensitive by the California Native Plant Society (CNPS) and County, which include the 2 aforementioned species as well as variegated dudleya (*Dudleya variegata*), decumbent goldenbush (*Isocoma menziesii* var. *decumbens*), San Diego barrel cactus, and graceful tarplant (*Holocarpha virgata* ssp. *elongata*). Each of these species is further discussed below and is depicted on Figure 4. A list of sensitive plant species with potential to occur within the BOS is provided in Appendix B.

San Diego button-celery (*Eryngium aristulatum* var. *parishii*)

Listing: FE/SE; CNPS List 1B.1; County Group A; MSCP Covered

Distribution: San Diego and Riverside counties; Baja California, Mexico

Habitat: Vernal pools or mima mound areas with vernal moist conditions are preferred habitat

Status on site: Approximately 1,547 individuals occur within vernal pools within the BOS.

MSCP Management Requirements: Area specific management directives must include specific measures to protect against detrimental edge effects.

Otay mesa mint (*Pogogyne nudiuscula*)

Listing: FE/SE; CNPS List 1B.1; County Group A; MSCP Covered

Distribution: Southwestern San Diego County; Baja California, Mexico

Habitat: Restricted to vernal pools

Status on site: Species was observed in 2 locations within the BOS. A count of individual plants was not completed.

MSCP Management Requirements: Area specific management directives must include measures to: (1) protect against detrimental edge effects; (2) maintain surrounding habitat for pollinators; and (3) maintain pool watershed areas.

Variegated dudleya (*Dudleya variegata*)

Listing: --/--; CNPS List 1B.2; MSCP NE; MSCP Covered; County Group A

Distribution: San Diego and Baja

Habitat: Valley and foothill grassland, chaparral, coastal scrub, cismontane woodland, and vernal pools below 1,800 feet AMSL

Status on site: Approximately 2,350 individuals observed within the BOS

MSCP Management Requirements: Area specific management directives must include species-specific monitoring and specific measures to protect against detrimental edge effects to this species, including effects caused by recreational activities. Some populations now occur within a Major Amendment Area (Otay Mountain), and at the time permit amendments are proposed, strategies to provide protection for this species within the Amendment Area must be included.

Decumbent goldenbush (*Isocoma menziesii* var. *decumbens*)

Listing: --/--; CNPS List 1B.2; County Group A

Distribution: Orange and San Diego counties; Baja California, Mexico; San Clemente and Santa Catalina islands

Habitat: Presumed to utilize coastal sage scrub habitat intermixed with grassland and is more partial to clay soils than other closely related varieties

Status on site: Species was observed in 4 locations within the BOS. A count of individual plants was not completed.

MSCP Management Requirements: Area specific management directives have not been established for this species.

San Diego barrel cactus (*Ferocactus viridescens*)

Listing: --/--; CNPS List 2.1; MSCP Covered; County Group B

Distribution: San Diego County and Baja

Habitat: Dry slopes in coastal sage scrub

Status on site: Approximately 23 individuals were observed within the BOS

MSCP Management Requirements: Area specific management directives must include measures to protect this species from edge effects and unauthorized collection. Directives should also include appropriate fire management/control practices to protect against a too frequent fire cycle.

Graceful tarplant (*Holocarpha virgata* ssp. *elongata*)

Listing: --/--; CNPS List 4.2; CA Endemic; County Group D

Distribution: San Diego, Orange, and Riverside counties

Habitat: Coastal mesas and foothills with grassland habitats

Status on site: Species was observed in 4 locations within the BOS. A count of individual plants was not completed.

MSCP Management Requirements: Area specific management directives have not been established for this species.

4.2.3 Non-native and/or Invasive Plant Species

Several non-native grasses and forbs occur within the BOS, and are identified in Appendix A. The species posing the greatest management issue are mustard (*Brassica* sp.) and fennel (*Foeniculum vulgare*).

4.3 WILDLIFE SPECIES

4.3.1 Wildlife Species Correlation with Habitat within the BOS

A total of 85 animal species were observed within the 273-acre Lonestar Ridge property during general and focused surveys conducted between 2002 and 2008, including 2 crustaceans, 23 butterflies (among other invertebrates), 1 amphibian, 3 reptiles, 48 birds, and 7 mammals (Appendix C), the majority of which have potential to occur within the 68.72-acre BOS.

4.3.2 Rare, Threatened, or Endangered Wildlife

A total of 2 sensitive animal species have been observed/detected within the BOS (Figure 4), including the federally listed endangered species: San Diego fairy shrimp and federal listed threatened coastal California gnatcatcher (*Polioptila californica californica*). Several other sensitive species have been observed/detected on the larger 273-acre Lonestar Ridge property, and are identified in the list of potentially occurring sensitive animal species in Appendix D. An explanation of status codes for both plant and animal species sensitivity status is presented in Appendix E.

San Diego fairy shrimp (*Branchinecta sandiegonensis*)

Listing: FE/--; MSCP NE; County Group 1

Distribution: San Diego County

Habitat: Seasonal pools that occur in tectonic swales or earth slump basins and other areas of shallow and standing water, often in patches of grassland and agriculture interspersed in coastal sage scrub and chaparral

Status on site: Detected in 1 basin within the BOS

MSCP Management Requirements: Area specific management directives must include specific measures to protect against detrimental edge effects to this species.

Coastal California gnatcatcher (*Polioptila californica californica*)

Status: FT/SSC; County Group 1; County MSCP Covered

Distribution: In San Diego County, occurs throughout coastal lowlands

Habitat(s): Coastal sage scrub

Status on site: Species observed in Diegan coastal sage scrub within the BOS

MSCP Management Requirements: Area specific management directives must include measures to reduce edge effects and minimize disturbance during the nesting period, fire protection measures to reduce the potential for habitat degradation due to unplanned fire, and management measures to maintain or improve habitat quality including vegetation structure. No clearing of occupied habitat within the County's Biological Resource Core Areas may occur between March 1 and August 15.

4.3.3 Non-native and/or Invasive Wildlife

The only non-native animal species that was observed within the site during field surveys is the European starling (*Sturnus vulgaris*), which was introduced to North America in the 19th century. This species is widespread throughout San Diego County, where it competes for nest cavities with native birds such as the acorn woodpecker (*Melanerpes formicivorus*), northern flicker (*Colaptes auratus*), and purple martin (*Progne subis*; Unitt 2004).

4.4 OVERALL BIOLOGICAL AND CONSERVATION VALUE

The 68.72-acre BOS occurs within the City's MHPA and supports numerous sensitive plant and animal species, in addition to preserving coastal sage scrub, vernal pool, and grassland habitat. Land north and south the BOS is within the MSCP Preserve. The BOS is also adjacent to other mitigation land, including an open space parcel to the east of the BOS (for the Otay Crossings Commerce Park project) as well as land south of the BOS (for SR-125).

Following vernal pool restoration activities, the BOS will support 1.14 acres of vernal pool/basins with fairy shrimp, 11.38 acres of Diegan coastal sage scrub, and 56.20 acres of non-native grassland. Sensitive resources occurring within the BOS include 1,547 San Diego button-celery, 2,350 variegated dudleya, 23 San Diego barrel cactus, an unknown number of Otay mesa mint, graceful tarplant, and decumbent goldenbush. The BOS will also conserve 1 coastal California gnatcatcher location, and vernal pools/basins with San Diego fairy shrimp, as well as habitat for several other sensitive animal species, including California horned lark (*Eremophila alpestris*), grasshopper sparrow (*Ammodramus savannarum*), white-tailed kite (*Elanus leucurus*), loggerhead shrike (*Lanius ludovicianus*), and western spadefoot (*Spea hammondi*). As previously stated, the site is bounded by existing conserved lands, which in combination will secure conservation of the entire mesa in this location east of SR-125 and help achieve the goal of protecting a regional population of variegated dudleya.

4.5 ENHANCEMENT AND RESTORATION OPPORTUNITIES

As stated above, approximately 68.72 acres of land will be dedicated as biological open space. These parcels present an excellent opportunity to enhance vernal pools, enhance QCB habitat, and function as a long-term burrowing owl receptor site. The following enhancement efforts will be conducted within the BOS (HELIX 2011c):

- Approximately 0.48 acre of vernal pools will be restored (new pools) within the BOS. The restored vernal pools will support vernal pool plant indicator species (U.S. Army Corps of Engineers [Corps 1997]) and function as viable, self-sustaining vernal pool basins. In addition, salvage of soil containing fairy shrimp cysts in the impacted pools and will be used to inoculate a minimum of 0.42 acre of enhanced/restored pools with San Diego and Riverside fairy shrimp.
- Burrowing owl habitat will be created with the installation of 35 artificial burrows, and ensuring long-term protection of habitat for the owls as well as other natural resources.
- Salvage and translocation of the populations of variegated dudleya, San Diego button-celery, San Diego barrel cactus, and spreading navarretia on the Otay Business Park site

to the BOS will occur. The salvaged variegated dudleya, San Diego button-celery, and spreading navarretia, and San Diego barrel cactus will be incorporated into the vernal pool restoration area. San Diego barrel cactus also will be included in the Diegan coastal sage scrub planting palette. In addition, soil containing San Diego button-celery and spreading navarretia will be salvaged and used to inoculate restoration pools in the BOS vernal pool preserve. Chocolate lily seeds would be collected from the project site and used in restoration efforts within the Lonestar BOS.

- QCB host plant species and nectar plants will be included in the vernal pool watershed restoration effort, and 6 QCB habitat focused planting areas will be created within the vernal pool restoration area within the Lonestar BOS (Figure 4).
- The project applicant proposes to mitigate impacts to saltgrass grassland with native grass restoration within the watershed restoration area surrounding the restored vernal pools on the Lonestar Parcels.

The Resource Manager will not be responsible for maintenance of the restoration area until the 5-year maintenance and monitoring period for vernal pool restoration has been successfully completed. A restoration specialist will be responsible for overall supervision of the installation, maintenance, and monitoring of the restoration areas for the 5 years.

4.6 CULTURAL RESOURCES DESCRIPTION

4.6.1 Archaeological Resources

The Lonestar Ridge project area, which encompasses approximately 273 acres, of which 68.72 acres are within the BOS for this RMP, has been surveyed for cultural resources in whole or in part several times in the past, and was most recently surveyed in 2004 by Affinis (2004).

The results of Affinis' study identified 28 archaeological sites within the overall Lonestar Ridge project area, including development areas and mitigation parcels, as well as California Department of Transportation (Caltrans) right-of-way (now occupied by SR-125). Affinis archaeologists identified 6 previously undocumented sites within the 273-acre area, which, along with the other 22 sites, were assessed for cultural significance (Table 3).

Table 3
CULTURAL RESOURCES
WITHIN OVERALL LONESTAR RIDGE PROJECT AREA

Site Number (CA-SDI-#)	Site Description	Tested?	Significant?	Reference
11,210	Light lithic scatter: scrapers, choppers, flakes, cores	Yes*	No	Carrico et al. 1992; Smith 1989
11,211	Light to moderately dense lithic scatter: flaked stone tools, cores, flakes/debitage	Yes*	No**	Carrico et al. 1992; Rosen 1999; Smith 1989
11,212†	Light lithic scatter: scrapers, choppers, flakes, cores	Yes*	No**	Carrico et al. 1992; Rosen 1999; Smith 1989
11,213†	Light to moderate lithic scatter: flaked stone tools, cores, flakes, manos, metate fragments, biface point base	Yes*	No**	Carrico et al. 1992; Rosen 1999; Smith 1989
11,214	Light and widely dispersed scatter of lithic artifacts; lithic tool fragments, flakes/debitage	Yes*	No	Carrico et al. 1992; Smith 1989
11,215/11,216 †	Light lithic scatter; scraper planes, scrapers, choppers, flakes	Yes*	No	Carrico et al. 1992; Smith 1989
11,217†	Light lithic scatter: scrapers, choppers, flakes, cores. Historic materials include window glass, square nails, wire, brick and mortar, kitchen items, and consumer goods	Yes*	Undetermined*	Carrico et al. 1992; Smith 1989

Table 3 (cont.)
CULTURAL RESOURCES
WITHIN OVERALL LONESTAR RIDGE PROJECT AREA

11,218†	Light lithic scatter: scraper, flakes. Small amount of historic material: purple glass, mortar and brick	Yes*	Undetermined*	Carrico et al. 1992; Smith 1989
11,219†	Light lithic scatter: scrapers, scraper planes hammers, flakes. Historic material includes window glass, square nails, wire, brick and mortar, kitchen items, and consumer goods.	Yes*	Undetermined*	Carrico et al. 1992; Smith 1989
11,220	Light, widely dispersed lithic scatter: scraper planes, scrapers, choppers, flakes, cores	Yes*	No***	Carrico et al. 1992; Rosen 2002; Smith 1989
11,221	Historic dump location where trash was disposed of down the slope of a canyon: glass, ironstone, metal fragments, building material, leather, kitchen items, consumer goods, iron stove parts, hinges, farm equipment, wood. Turn of 20 th century.	Yes*	Undetermined*	Carrico et al. 1992; Smith 1989
11,363	Lithic scatter: flakes and cores	No	No***	Carrico et al. 1992; Ritz et al. 1989; Rosen 2002
11,367/11,368	Sparse lithic scatter: flakes and cores	Yes	No***	Carrico et al. 1992; Ritz et al. 1989; Rosen 1990, 2002

Table 3 (cont.)
CULTURAL RESOURCES
WITHIN OVERALL LONESTAR RIDGE PROJECT AREA

11,951	Light lithic scatter	No	No**	Carrico et al. 1992; Rosen 1990, 1999
12,273H†	Small scatter of historic artifacts possibly associated with historic structure on 1903 USGS 30' Cuyamaca quadrangle	Yes	No	Carrico et al. 1992; Van Wormer et al. 1994
12,337†	Extremely large lithic scatter that encompasses CA-SDI-5352, -9974, -10,072, and -10,735	Yes	No	Byrd et al. 1994; Cupples and Eidsness 1978; Kyle and Gallegos 1992a-f; Kyle et al. 1996; Rosen 1990
14,210/H	Lithic scatter: scrapers, hammerstones, retouched flakes, flakes. Historic trash scatter: purple bottle fragments, bottle necks, ironstone, ceramics, metal fragments	No	Undetermined	Smith 1996
14,239	Lithic scatter: scrapers, retouched flake, core, flakes	No	No***	Rosen 2002; Smith 1996
14,241	Lithic scatter: retouched flake, flakes	No	No	Smith 1996
14,246	Lithic scatter: scrapers, retouched flake, flakes	No	No**	Rosen 1999; Smith 1996
14,248	Lithic scatter: scrapers, hammerstones, cores, flakes	No	No**	Rosen 1999; Smith 1996

Table 3 (cont.)
CULTURAL RESOURCES
WITHIN OVERALL LONESTAR RIDGE PROJECT AREA

14,250H†	Historic trash dump, including glass (purple, white, green), ironstone, metal	No	Undetermined	Smith 1996
Site 3†	Light lithic scatter: cores and flakes	No	No	Affinis 2004
Site 4	Light lithic scatter: cores and flakes	No	No	Affinis 2004
Site 6	Light lithic scatter: cores and flakes	No	No	Affinis 2004
Site 7	Light lithic scatter: cores and flakes	No	No	Affinis 2004
Site 8	Light lithic scatter: scrapers, cores and flakes	No	No	Affinis 2004
Site 10	Light lithic scatter: cores and flakes	No	No	Affinis 2004

†Site located in development area west of SR-125

*Sites were tested by Smith (1989), but report was never finalized, and the adequacy of the testing was not determined by City staff

**Sites were addressed in conjunction with SR-125 (Rosen 1999)

***Sites were addressed by Caltrans programmatically as not significant, per the *Management Plan for Otay Mesa Prehistoric Resources* (Rosen 2002)

At least 10 of the identified sites are in the western half of the Lonestar Ridge area and therefore outside of the BOS. Of the 18 sites that may be within or partially within the BOS, significance was undetermined for 2 of them (CA-SDI-11,221 and -14,210/H), and the remaining 16 were considered not significant. As such, consultation with a cultural resource professional will be initiated prior to any earthwork in the BOS.

All cultural resource sites located within the BOS must be preserved and maintained as they are discovered. Monitoring and general stewardship measures will be implemented to protect these resources.

The cultural sites preserved within the BOS will be monitored during regular site visits to ensure that no natural or human-induced impacts have occurred.

Avoidance is generally the best preservation method for the cultural resources within the BOS; therefore, no signage will be installed drawing attention to any cultural sites within the preserve. Given the low significance of the cultural resources on the site, fencing is not anticipated to be

necessary. The resource manager will also be responsible for removing any trash or debris that is found on or around the cultural sites.

No substantial management constraints are expected that may affect preservation of cultural resources within the BOS.

4.6.2 Native American Consultation

There is no indication that the project site was used by Native Americans for religious, ritual, or other special activities and, therefore, impacts to Native American burial sites are not expected. A consultation has not taken place but will be initiated by the Resource Manager following acceptance of the BOS.

4.6.3 Historical Resources

The BOS does not support any known structures.

5.0 BIOLOGICAL ELEMENT GOALS

The ultimate goal of this RMP is to detail the methods to preserve and manage lands to the benefit of the flora, fauna, and native ecosystem functions reflected in the natural communities occurring within the RMP land. In addition, this RMP establishes the following goals with regard to biological resources:

Vegetation Communities: To preserve 68.72 acres of habitat within the BOS in perpetuity. Within the BOS, habitat will be monitored for: (1) quality, (2) exotic plant control measures will be implemented to prevent or reduce the spread of weeds, and (3) adaptive management will be conducted if necessary following fire or flood events.

Sensitive Species: To ensure the continued existence of all sensitive plant and animal species and/or to facilitate expansion of sensitive plant and animal species within the open space.

5.1 BIOLOGICAL MANAGEMENT TASKS

The BOS will be visually inspected for changes during monthly maintenance and monitoring visits, and all observations will be documented. Any substantial changes will be monitored more closely to determine the necessity of additional measures. Such visits shall include the monitoring of the spread of exotic plant species and accumulation of trash/debris. Fences and signs associated with the BOS also will be inspected and any necessary repairs noted.

Baseline Biological Inventory

The quantity and quality of vegetation communities within the BOS will be documented during the first year of active management following successful completion of the habitat

enhancement/restoration effort. This inventory will incorporate data from the biological technical report for the Lonestar Industrial Park project (HELIX 2009a), the final annual monitoring report for the restoration and enhancement effort, and the findings of an initial baseline inventory field survey. Vegetation mapping in the baseline survey will follow the latest SANDAG/CDFG vegetation classification system based on the Manual of California Vegetation. These data will allow the Resource Manager to measure habitat changes caused by natural and human effects and to evaluate management efforts during subsequent years.

Upon implementation of this RMP, the Resource Manager will be provided digital files containing the existing vegetation and sensitive resources data, which will be updated following the baseline inventory field survey during the start-up (first year) phase of the RMP. The intent of this update is to document current conditions in the open space areas (including graphic and tabular depictions of habitat acreages), document all species observed (either directly or indirectly by sign such as scat, tracks, etc.) within each identified habitat type, and document the locations of any sensitive plant and animal species.

The baseline inventory update will be conducted during the first year of active management. To optimize the probability of detecting sensitive species reported or expected to occur within the BOS, this survey should be conducted between March and May, when the majority of sensitive plant and animal species are most detectable.

Update Biological Mapping

Vegetation and sensitive species mapping will be updated every 5 years following implementation of this RMP. A site visit should be conducted using updated aerial photography to determine vegetation communities present at the time of the survey. Any observed/detected sensitive species will be added to the biological resources maps of the BOS.

Sensitive Species Monitoring

Preservation of sensitive plant and animal populations within the BOS is one step in achieving the overall long-term conservation of these species. Monitoring of sensitive species is another step in achieving the overall long-term conservation of these species. Sensitive species monitoring will help the Resource Manager identify long- and short-term threats and recommend any necessary protective measures. Sensitive plant and animal monitoring will occur during management activities, and the locations of any observed/detected sensitive species will be documented and added to the biological resources maps. Adaptive management measures may be required to intervene when either natural or man-made disturbances or effects appear to be adversely influencing a sensitive species.

It is the responsibility of the Resource Manager to evaluate the status of preserved species within the preserve and to institute protective measures if any individual species becomes threatened. Sensitive species population monitoring will vary based on the target species. In each assessment, the Resource Manager will observe and document sensitive species locations and conditions. Monitoring/reporting efforts will include all sensitive species previously documented within the BOS.

Rare Plant Surveys

A rare plant survey will be conducted 2 of every 5 years throughout the BOS during the appropriate survey period for the 7 sensitive plant species anticipated to occur within the BOS (Table 4). The Resource Manager will decide in which years the surveys will be conducted, with the goal of surveying during average or above-average rainfall years. A visual estimate of variegated dudleya, rather than direct counts, will occur. Presence/absence surveys for San Diego button-celery and Otay mesa mint may be conducted concurrently with fairy shrimp surveys, as the focus area will be vernal pools/basins. Presence/absence surveys will be conducted for the remaining sensitive species observed, with specific attention given to any factors that may be negatively affecting those species (i.e., vandalism, mortality, etc.). In addition, an annual visual assessment of each population of sensitive species will be conducted during a regular maintenance event and will be compared to results from previous years in order to help track overall population trends.

Table 4
BLOOMING PERIODS*/SURVEY SEASON
FOR SENSITIVE PLANT SPECIES WITHIN THE BOS*

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Otay mesa mint (<i>Pogogyne nudiuscula</i>)					X	X	X					
Variegated dudleya (<i>Dudleya variegata</i>)				X	X	X						
San Diego button-celery (<i>Eryngium aristulatum</i> var. <i>parishii</i>)				X	X	X						
Spreading navarretia (<i>Navarretia fossalis</i>)				X	X	X						
Decumbent goldenbush (<i>Isocoma menziesii</i> var. <i>decumbens</i>)				X	X	X	X	X	X	X	X	
Graceful tarplant (<i>Holocarpha virgata</i> ssp. <i>elongata</i>)					X	X	X	X	X	X	X	
San Diego barrel cactus (<i>Ferocactus</i> <i>viridescens</i>)	Survey season is year-round, blooms not necessary											

*Blooming periods are from CNPS 2009

Coastal California Gnatcatcher Surveys

A 1-day survey for coastal California gnatcatcher will be conducted 2 out of every 5 years within appropriate habitat in the BOS. Each survey will occur during the breeding season (March 1 to August 15). The Resource Manager will decide in which years the surveys will be conducted. The surveys will only be conducted during protocol-level conditions. Any coastal California gnatcatcher observed incidentally during other surveys will also be documented.

Fairy Shrimp Surveys

Presence/absence surveys for San Diego and Riverside fairy shrimp will be conducted every 2 of 5 years during the wet season within appropriate habitat in the BOS. The surveys will consist of up to 4 consecutive (every other week) survey visits timed to coincide with peak ponding in the vernal pools on site. The Resource Manager will decide in which years the surveys will be conducted. Presence/absence surveys for San Diego button-celery and Otay mesa mint may be conducted concurrently with fairy shrimp surveys.

Exotic Plant Control

The Resource Manager will coordinate with land developers and owners adjacent to the BOS to provide information regarding exotic plant species and to increase the efficiency of exotic plant control programs. To accommodate changing growth patterns, weeding will occur as needed at the discretion of the Resource Manager. Weeding will occur by manual or mechanical means; no weed whips or chemical herbicides may be used unless specifically determined to be necessary by the Resource Manager. The Resource Manager is responsible for removal of species rated as High by the California Invasive Plant Council (Cal-IPC) within 2 weeks after discovery. Special attention will be paid to eradicating mustard and fennel, which can form dense local populations and drastically alter the composition and structure of many plant communities (Cal-IPC 2006). Non-native grasses will not be prioritized for removal unless it is determined by the Resource Manager that they are significantly impacting a sensitive resource. General weeding events will occur twice annually: in January/February and April/May.

If the use of herbicide is deemed necessary, application should be minimal, and may only occur in compliance with all federal and state laws. Use of chemical herbicides should be determined in coordination with the County Department of Environmental Health. All herbicide use will be applied by backpack sprayers or stump painting directly on target weeds and will involve short duration, biodegradable chemicals.

Predator Control

A moderate tolerance for pest species will be permitted, but if the Resource Manager determines that pest eradication measures (pesticide application or trapping) are required, the USFWS and/or CDFG will be contacted to determine the need and appropriate methods, including potentially hiring a licensed pest control advisor. Exotic species control/eradication programs

should be implemented at the appropriate time of year depending on the pest species and field conditions, and should be coordinated with efforts on adjacent properties.

Fire Management

Fire is an important element in the ecology of southern California but can also present potential hazards to habitat within the BOS. Following fire events, vegetation within the BOS will be allowed to recover naturally; however, seeding and/or planting of container stock may be required at the discretion of the Resource Manager. Special attention to weed establishment following fire will be assessed by the Biologist.

5.2 ADAPTIVE MANAGEMENT

The Resource Manager is responsible for interpreting the results of site monitoring to determine the ongoing success of the RMP. If it is necessary to modify the plan between regularly scheduled updates, plan changes shall be submitted to the County and agencies for approval as required. Adaptive management tools may include weeding, planting, and other measures deemed appropriate by the Resource Manager.

5.3 OPERATIONS, MAINTENANCE, AND ADMINISTRATION TASKS

A list of tasks such as baseline inventory, vegetation mapping, species survey, species, management, etc. is included in Table 1.

5.3.1 Goals

Ongoing maintenance and administration, which will be the responsibility of the Resource Manager, will be conducted to ensure no loss of resource quality within the BOS.

5.3.2 Tasks

The general operations, maintenance, and administrative tasks to be conducted by the Resource Manager will include the following tasks.

Annual Monitoring Reports

A letter report will be submitted to the USFWS, CDFG, and County that will summarize the overall condition of vegetation communities and sensitive species in the BOS, propose management tasks for the following year, and discuss results of management activities proposed in the previous report. Submitted annually by the end of January, this letter report will compare the most recent data with those collected in previous years, evaluate sensitive species status and local wildlife corridor use, and outline appropriate remedial measures. Fees for County review will also be included with submittal of the annual report.

The results of all updated vegetation mapping (every fifth year), sensitive plant surveys (2 of every 5 years), and sensitive animal surveys (varies by species) should be included in the appropriate annual letter reports.

Management Plan Review

This RMP will be reviewed every 5 years to determine the need for revisions or updates. Due to changing conditions on site, it may be necessary to revise the tasks outlined in this plan to ensure continued success of the stated goals.

Access Control

To prevent human-induced degradation of the BOS due to illegal occupancy, trespassing (off-highway vehicle activity), removal of resources, or dumping of trash or debris, the Resource Manager will restrict access to the BOS. Permanent signage will be posted every 500 feet along the northern and western boundaries of the BOS and at locations of any unauthorized trails entering the BOS and be maintained by the Resource Manager. All signs will be corrosion-resistant (e.g., constructed of steel), measure at minimum 6 by 9 inches in size, be posted on a metal post at least 3 feet above ground level, and provide notice in both English and Spanish that the area is an ecological preserve with trespassing prohibited. The signs will state the following:

Sensitive Environmental Resources

Area Restricted by Easement

Entry without express written permission from the County of San Diego is prohibited.

To report a violation or for more information about easement restrictions and exceptions contact the County of San Diego, Department of Planning and Land Use

Reference: TM5505

Fencing

Temporary 3-strand barbless wire will be installed around the vernal pool mitigation areas. It will remain in place during the 5-year maintenance and monitoring period. Installation of temporary fencing is the responsibility of the project applicant. Fencing exists between the BOS and SR-125 right-of-way. No other permanent fencing is proposed.

Additional fencing needs will be identified by the Resource Manager and a fencing plan will be submitted to the County for review prior to installation. Such fencing may be required for:

- Prevention of unauthorized vehicle access;
- Protection of open space boundaries (e.g., along utility easements);
- Prevention of trail formation within the preserve; and/or

Illegal Occupancy

Illegal occupancy is common in open space areas, although this is not anticipated to be an issue on this site because of the open nature of the habitat. The Resource Manager will survey the

BOS for evidence of illegal access concurrently with other site management activities and file a report with the Sheriff and the County DPLU, if necessary.

Removal of Resources

Removal of any plants, animals, rocks, minerals, or other natural resources from the preserve is prohibited. The Resource Manager will maintain a log of illegal collecting and may report individuals caught removing natural resources from the BOS to the USFWS, CDFG, County, and/or Sheriff's Office. The Resource Manager may allow and supervise seed collection and plant cuttings as part of revegetation efforts within the preserve and/or in nearby areas. Any such collected plant materials should be limited to that necessary to ensure successful revegetation while not adversely affecting local plant populations.

Maintain Confidentiality of Archaeological Site Locations

Successful management of resources within the BOS will require maintenance of the cultural resource sites. Due to the sensitive nature of these cultural resources, the Resource Manager will maintain records of their locations and ensure that they remain confidential.

Trash Removal and Vandalism Repair

The Resource Manager will also conduct general trash removal within the BOS during regular management site visits. Additionally, damage caused by vandalism will be repaired. Trash removal and vandalism repair will occur as needed during regular bi-monthly (every other month) site visits.

Hazardous Materials Monitoring

The release of hazardous materials such as fuels, oil, vegetation clippings, trash, and landscaping related chemicals (e.g., pesticides and herbicides) has potential to affect the BOS negatively. Although no specific survey will be conducted, if such hazardous materials are observed within the BOS during regular bi-monthly (every other month) site visits, remedial measures to remove the material will occur.

5.4 MANAGEMENT CONSTRAINTS

This RMP follows the regulatory and permitting requirements of the USFWS, CDFG, and County. Although it anticipates measures for most foreseeable contingencies, several external constraints remain. For example, illegal trespassing could negatively impact sensitive animal species, and environmental factors, such as prolonged drought, could have detrimental effects on sensitive plant populations within the BOS. Other management constraints include potential noise effects from SR 125.

5.5 PUBLIC USE TASKS

Compatible public uses of the site include scientific uses. The BOS will not have public trails or other facilities. No motorized recreational vehicles, hunting, or unauthorized collection will be allowed within the BOS. Existing trails will be blocked and/or demarcated with signage to prevent continued use. No additional trails will be installed. Because no trails will be allowed within the BOS, no informative services will be provided (Table 1).

5.6 FIRE MANAGEMENT TASKS

A controlled burn of the site will be considered as part of the weed eradication strategy intended to improve habitat for burrowing owl and QCB. No other fire management activities (clearing, thinning, mowing, discing, blading, etc.) are planned within the BOS. All such measures to reduce wildfire risk are to occur entirely outside of the BOS.

6.0 LIST OF PREPARERS

The following individuals contributed to the preparation of this report.

Greg Mason*†	B.S., Natural Resources Planning & Interpretation, Humboldt State University, 1992
Justin Palmer	B.A., Geography, San Diego State University, 2001
Aleksandra Richards	M.A., International Relations, University of San Diego, 2010 B.A., Communications, California State University Fullerton, 2008
Phillip Tran	J.D., Law, Seattle University School of Law, 2001 M.A., Communications, San Diego State University, 1998 B.A., Political Science, University of California-San Diego, 1994

*Primary report author

†County-approved Biological Consultant

7.0 REFERENCES

- Affinis. 2004. Archaeological Resources Inventory, Lonestar Ridge, Otay Mesa, San Diego, California. July.
- Bauder, E. 1986. San Diego Vernal Pools: Recent and projected losses; their condition; and threats to their existence 1979-1990. Vols. 1 & 2. Prepared for the Endangered Plant Project, CDFG.
- Bowman, R. 1973. Soil Survey of the San Diego Area. U.S. Department of Agriculture in cooperation with the USDI, UC Agricultural Experiment Station, Bureau of Indian Affairs, Department of the Navy, and the U.S. Marine Corps.
- Byrd, B., C. Serr, and D. Saunders. 1994. Phase II Archaeological Evaluation of the Lonestar Site (CA-SDI-12, 337) in the SR 125 Project Corridor, Otay Mesa, San Diego County. Brian F. Mooney and Associates, San Diego.
- California Invasive Plant Council (Cal-IPC). 2006. California Invasive Plant Inventory. February. URL: <http://portal.cal-ipc.org/weedlist>.
- California Native Plant Society (CNPS). 2009. Inventory of Rare and Endangered Plants. Internet searchable database Version 7-09d. URL: <http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi>. Updated quarterly. October 7.
- Carrico, R. L., T.G. Cooley, A. Pigniolo, and K. Crawford. 1992. Cultural Resources Evaluation of the 23, 088-acre Otay Ranch. Ogden Environmental and Energy Services Company, San Diego.
- Cupples, S.A., and J.P. Eidsness. 1978. Archaeological Survey, Testing and Surface Collection at SDI-5352; Wetmore Lot Split, Otay Mesa, California. Advanced Planning and Research Associates, San Diego.
- Dudek & Associates, Inc. 1992. Report on the Flora of the Otay Ranch Vernal Pools 1990-1991, San Diego County, California. Unpublished report for The Baldwin Company.
- HELIX Environmental Planning, Inc. (HELIX). 2009a. Biological Technical Report for Lonestar Industrial Park. May 22.
- 2011a. Biological Technical Report for Otay Business Park. October 17.
- 2011b. On-site Resource Management Plan for Otay Business Park. October 17.
- 2011c. Vernal Pool Preserve Restoration Plan for Otay Business Park. October 17.
- Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California.

- Kyle, C.E., R. Phillips, A. Schroth, S. Ni Ghabhlain, and D.R. Gallegos. 1996. Otay Mesa Road Widening Project Cultural Resources Technical Report. DEP No. 95-0101.
- Kyle, C. E., and D.R. Gallegos. 1992a. Historic/Archaeological Survey and Testing for CA-SDI-5352 and CA-SDI-12,730, Otay Mesa, San Diego, California. ERCE, San Diego, and Gallegos and Associates, Carlsbad.
- 1992b. Archaeological Testing for a portion of CA-SDI-5352 located within Parcels 646-246-31 and 646-540-28, Otay Mesa, San Diego, California. Gallegos and Associates, Carlsbad.
- 1992c. Archaeological Testing for a portion of CA-SDI-5352 located within the George Ellis Parcel, Otay Mesa, San Diego, California. Gallegos and Associates, Carlsbad.
- 1992d. Archaeological Testing for a portion of CA-SDI-5352 located within the Robert Eggar, Jr. Parcel, Otay Mesa, San Diego, California. Gallegos and Associates, Carlsbad.
- 1992e. Archaeological Testing for a portion of CA-SDI-5352 located within the Struthers Trust #3 Parcel, Otay Mesa, San Diego, California. Gallegos and Associates, Carlsbad.
- 1992f. Archaeological Testing for a portion of CA-SDI-5352 located within the Zinser-Furby Parcel, Otay Mesa, San Diego, California. Gallegos and Associates, Carlsbad.
- Oberbauer, Thomas. 2008. Terrestrial Vegetation Communities in San Diego County Based on Holland's Descriptions. Revised from 1996 and 2005. July.
- Ritz, F., M. Davis, R.O. Collett, W.R. Manley, and S.M. Hector. 1989. Otay Ranch Archaeological Survey: San Ysidro Mountains Parcel, Proctor Valley Parcel, Otay River Parcel. Draft. Recon, San Diego.
- Rosen, M.D. 1990. Archaeological Survey Report for the Proposed State Route 125 from State Route 905 (near the Second Border Crossing) to State Route 54 (near the Sweetwater Reservoir), San Diego County, California. California Department of Transportation District 11, San Diego.
1999. Finding of Adverse Effect Pursuant to 36CFR§800 for State Route 125 South. California Department of Transportation District 11, San Diego.
2002. Negative Historic Property Survey Report (HPSR) – 6th Supplemental. California Department of Transportation District 11, San Diego.

- Smith B. F. 1989. Results of an Archaeological Survey and Evaluation of Cultural Resources within the Baldwin/Otay Ranch Business Park (EQD 89-0779). Brian F. Smith and Associates, San Diego.
1996. Results of an Archaeological Survey at the Otay Valley Parcel of the Otay Ranch. Brian F. Smith and Associates, San Diego.
- Unitt, P. 2004. San Diego County Bird Atlas. San Diego Natural History Museum. San Diego, CA.
- U.S. Army Corps of Engineers (Corps). 1997. Vernal Pool Plant Indicator Species List. November.
- Van Wormer, S.R., J. Schaefer, and S. Walter. 1994. Historic Study Report of Sites CA-SDI-11,374H, -11,383H, -12,272H, and 12,273H for State Route 125 on Otay Mesa, San Diego County, California. Brian F. Mooney and Associates, San Diego.
- Weather.com.2008.
http://www.weather.com/outlook/driving/interstate/wxclimatology/monthly/graph/92154?from=month_bottomnav_driving



Appendix A

PLANT SPECIES OBSERVED



Appendix A
PLANT SPECIES OBSERVED – LONESTAR RIDGE§

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>HABITAT**</u>
<i>Achillea millefolium</i> *	common yarrow	NNG
<i>Achnatherum diegoensis</i> †	San Diego County needlegrass	DCSS
<i>Allium</i> sp.	wild onion	NNG
<i>Amaranthus albus</i>	white tumbleweed	NNG
<i>Amsinckia menziesii</i> var. <i>intermedia</i>	rancher's fiddleneck	NNG
<i>Anagallis arvensis</i> *	scarlet pimpernel	NNG
<i>Artemisia californica</i>	California sagebrush	DCSS, NNG
<i>Astragalus trichopodus</i> var. <i>lonchus</i>	ocean locoweed	DCSS
<i>Atriplex semibaccata</i> *	Australian saltbush	NNG
<i>Avena barbata</i> *	wild oat	DCSS, NNG
<i>Avena fatua</i> *	wild oat	DCSS, NNG
<i>Beta vulgaris</i> *	sea beet	NNG
<i>Bloomeria crocea</i>	golden star	NNG, DCSS
<i>Brachypodium distachyon</i> *	purple falsebrome	NNG
<i>Brassica</i> sp.*	mustard	NNG
<i>Brassica nigra</i> *	black mustard	NNG
<i>Brodiaea jolonensis</i>	mesa brodiaea	NNG
<i>Bromus diandrus</i> *	common ripgut grass	NNG
<i>Bromus madritensis</i> ssp. <i>rubens</i> *	foxtail chess	NNG
<i>Calochortus splendens</i>	lilac mariposa lily	NNG
<i>Calystegia macrostegia</i>	morning glory	DCSS, NNG
<i>Castilleja exserta</i>	purple owl's clover	NNG
<i>Centaurea melitensis</i> *	star thistle	NNG
<i>Chenopodium murale</i> *	nettle-leaf goosefoot	NNG
<i>Chlorogalum parviflorum</i>	soap plant	NNG
<i>Chlorogalum pomeridianum</i>	soap plant	NNG
<i>Convolvulus arvensis</i> *	bindweed	NNG
<i>Cotula coronopifolia</i>	African brass-buttons	Pond
<i>Crassula connata</i>	dwarf stone-crop	DCSS
<i>Cressa truxillensis</i>	alkali weed	NNG
<i>Cryptantha</i> sp.	cryptantha	NNG
<i>Cynodon dactylon</i> *	Bermuda grass	NNG
<i>Delphinium</i> sp.	larkspur	DCSS
<i>Deinandra conjugens</i> †	Otay tarplant	DCSS, NNG
<i>Deinandra fasciculata</i>	fascicled tarplant	NNG
<i>Dichelostemma capitatum</i>	blue dicks	NNG
<i>Dimorphotheca aurantiaca</i> *	African daisy	NNG
<i>Dodecatheon clevelandii</i> ssp. <i>clevelandii</i>	Cleveland's shooting star	NNG
<i>Dudleya edulis</i>	ladies-fingers	DCSS
<i>Dudleya variegata</i> †	variegated dudleya	DCSS, NNG

Appendix A (cont.)
PLANT SPECIES OBSERVED – LONESTAR RIDGE§

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>HABITAT**</u>
<i>Eleocharis macrostachya</i>	pale spike-rush	VP
<i>Encelia californica</i>	California encelia	DCSS
<i>Eremocarpus setigerus</i>	dove weed	NNG
<i>Eriogonum fasciculatum</i>	California buckwheat	DCSS
<i>Eriophyllum confertiflorum</i>	golden yarrow	DCSS
<i>Erodium cicutarium</i> *	red-stem filaree	NNG
<i>Erodium moschatum</i> *	green-stem filaree	NNG
<i>Eryngium aristulatum</i> ssp. <i>parishii</i> †	San Diego button-celery	VP
<i>Eucalyptus</i> sp.*	eucalyptus	NNG, EW
<i>Ferocactus viridescens</i> †	San Diego barrel cactus	DCSS, NNG
<i>Fritillaria biflora</i>	chocolate lily	DCSS
<i>Foeniculum vulgare</i> *	fennel	NNG
<i>Galium</i> sp.	bedstraw	DCSS
<i>Gaura sinuata</i>	wavy leaved gaura	NNG
<i>Grindelia robusta</i>	gum plant	NNG
<i>Hedynois cretica</i> *	Crete hedynois	NNG
<i>Heteromeles arbutifolia</i>	toyon	DCSS, NNG
<i>Hirschfeldia incana</i>	perennial mustard	NNG
<i>Holocarpha virgata</i> ssp. <i>elongata</i> †	graceful tarplant	NNG
<i>Hordeum marinum</i> *	Mediterranean barley	NNG
<i>Hypochaeris glabra</i> *	smooth cat's-ear	NNG
<i>Isocoma menziesii</i>	goldenbush	NNG
<i>Isocoma menziesii</i> var. <i>decumbens</i> †	decumbant goldenbush	DCSS
<i>Isomeris arborea</i>	bladderpod	DCSS
<i>Lactuca serriola</i> *	wild lettuce	NNG
<i>Lamarckia aurea</i> *	goldentop	NNG
<i>Lasthenia californica</i>	goldenfields	NNG, DCSS
<i>Lepidium lasiocarpum</i>	sand peppergrass	DCSS, NNG
<i>Lessingia filaginifolia</i>	sand-aster	NNG
<i>Lolium multiflorum</i> *	ryegrass	NNG
<i>Lotus scoparius</i>	deerweed	DCSS
<i>Malvella leprosa</i>	alkali-mallow	NNG
<i>Marrubium vulgare</i> *	horehound	NNG
<i>Medicago polymorpha</i> *	bur-clover	NNG
<i>Melilotus indica</i> *	Indian sweet clover	NNG
<i>Mirabilis californica</i>	wishbone plant	DCSS
<i>Mesembryanthemum nodiflorum</i>	slender-leaved iceplant	NNG
<i>Muilla clevelandii</i> †	San Diego goldenstar	DCSS
<i>Nassella lepida</i>	foothill needlegrass	NNG
<i>Nassella pulchra</i>	purple needlegrass	NNG
<i>Olea europaea</i> *	olive	NNG

Appendix A (cont.)
PLANT SPECIES OBSERVED – LONESTAR RIDGE§

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>HABITAT**</u>
<i>Opuntia littoralis</i>	prickly pear cactus	DCSS, NNG
<i>Opuntia prolifera</i>	cholla	DCSS
<i>Oxalis</i> sp.*	sorrel	NNG
<i>Phalaris</i> sp.*	canary grass	NNG
<i>Picris echoides</i> †	bristly ox-tongue	NNG
<i>Plagiobothrys</i> sp.	popcorn flower	VP
<i>Plantago erecta</i>	dwarf plantain	NNG
<i>Pogogyne nudiuscula</i> †	Otay mesa mint	VP
<i>Polygonum arenastrum</i> *	knotweed	NNG
<i>Ranunculus californicus</i>	California buttercup	NNG
<i>Rhus integrifolia</i>	lemonade berry	DCSS, NNG
<i>Rumex crispus</i> *	curly dock	NNG
<i>Rumex maritimus</i>	golden dock	NNG
<i>Salsola tragus</i> *	Russian thistle	DCSS, NNG
<i>Sanicula arguta</i>	sharp-tooth sanicle	NNG
<i>Sambucus mexicana</i>	blue elderberry	DCSS
<i>Selaginella cinerascens</i>	ashy spike-moss	DCSS, NNG
<i>Sidalcea malvaeflora</i>	checker-bloom	NNG
<i>Sisyrinchium bellum</i>	blue-eyed grass	DCSS, NNG
<i>Sonchus asper</i> *	prickly sow thistle	NNG
<i>Sonchus oleraceus</i> *	common sow thistle	NNG
<i>Stachys ajugoides</i> var. <i>rigida</i>	hedge-nettle	Pond
<i>Tamarix</i> sp.	tamarisk	Pond
<i>Viguiera laciniata</i> †	San Diego sunflower	DCSS
<i>Zigadenus fremontii</i>	star lily	NNG

§Species list is for the entire 273-acre Lonestar Ridge site, which encompasses the 82-acre biological open space (BOS) proposed as partial mitigation for impacts associated with Otay Crossings Commerce Park.

†Denotes sensitive species

*Denotes non-native species

**Habitat Acronyms: DCSS=Diegan coastal sage scrub, EW=Eucalyptus woodland, NNG=Non-native grassland, VP=Vernal pool. Eucalyptus woodland does not occur within the BOS.

THIS PAGE INTENTIONALLY LEFT BLANK

A blue decorative shape in the top right corner, consisting of a rectangle with a curved left edge tapering to a point.

Appendix B

SENSITIVE PLANT SPECIES WITH POTENTIAL TO OCCUR



Appendix B
SENSITIVE PLANT SPECIES WITH POTENTIAL TO OCCUR

SPECIES	STATUS*	POTENTIAL/HABITAT/RATIONALE
San Diego thornmint (<i>Acanthomintha ilicifolia</i>)	--/SE CNPS List 1B.1 MSCP NE	Moderate. Occurs on clay soils in chaparral, coastal sage scrub, grasslands, and vernal pools.
California adolphia (<i>Adolphia californica</i>)	--/-- CNPS List 2.1	Low. Found in habitats with clay soils. Would have been observed if present.
Shaw's agave (<i>Agave shawii</i>)	--/-- CNPS List 2.1 MSCP NE	Moderate. Would have been detected if present in coastal sage scrub.
San Diego bur-sage (<i>Ambrosia chenopodiifolia</i>)	--/-- CNPS List 2.1	Low. Found on dry sunny hillsides within maritime succulent scrub and coastal sage scrub. Would have been observed if present.
San Diego ambrosia (<i>Ambrosia pumila</i>)	FE/-- CNPS List 1B.1 MSCP NE	Low. Very limited range. Generally associated with upper river terraces.
Dean's milk-vetch (<i>Astragalus deanei</i>)	--/-- CNPS List 1B.1 CA Endemic	Low. Chaparral, coastal sage scrub, and riparian scrub. Would have been detected if present.
Golden-spined cereus (<i>Bergerocactus emoryi</i>)	--/-- CNPS List 2.2	Low. Habitat in sandy soils and bluffs associated with coastal sage scrub and maritime succulent scrub. Would have been found if present.
Orcutt's brodiaea (<i>Brodiaea orcuttii</i>)	--/-- CNPS List 1B.1 MSCP Covered	Moderate. Found in chaparral, meadows and seeps, grassland, and vernal pools. Would have been observed if present.
Orcutt's bird-beak (<i>Cordylanthus orcuttianus</i>)	--/-- CNPS List 2.1 MSCP Covered	Moderate. Found in coastal sage scrub.
Otay tarplant (<i>Deinandra conjugens</i>)	FT/SE CNPS List 1B.1 City MSCP NE	Moderate. Fractured clay soils in grasslands or sparsely vegetated Diegan coastal sage scrub. Species found within adjacent open space.
Western dichondra (<i>Dichondra occidentalis</i>)	--/-- CNPS List 4.2	Moderate. Found in sandy banks within coastal sage scrub, chaparral, or southern oak woodland. Often proliferates on recently burned slopes.
Orcutt's dudleya (<i>Dudleya attenuata</i> ssp. <i>orcuttii</i>)	--/-- CNPS List 2.1	Low. Occurs in coastal bluff scrub, chaparral, and coastal sage scrub. Known only from Border Field State Park.
Palmer's goldenbrush (<i>Ericameria palmeri</i> ssp. <i>palmeri</i>)	--/-- CNPS List 2.2 MSCP Covered	Low. Found in coastal sage scrub. Would have been found if present.
Palmer's grapplinghook (<i>Harpagonella palmeri</i>)	--/-- CNPS List 4.2	Moderate. Found in clay soils in chaparral, coastal sage scrub, and grasslands. Would have been detected if present in grasslands.
San Diego marsh elder (<i>Iva hayesiana</i>)	--/-- CNPS List 2.2	Low. Appropriate habitat does not occur on site. Occurs immediately off site in Johnson Canyon.

Appendix B (cont.)
SENSITIVE PLANT SPECIES WITH POTENTIAL TO OCCUR

SPECIES	STATUS*	POTENTIAL/HABITAT/RATIONALE
Gander's pitcher sage (<i>Lepechinia ganderi</i>)	--/-- CNPS List 1B.3 MSCP NE	Low. Found in chaparral, coastal sage scrub, and grasslands on gabbroic or metavolcanic soils. Generally found farther inland.
San Diego goldenstar (<i>Muilla clevelandii</i>)	--/-- CNPS List 1B.1 MSCP Covered	Moderate. Would likely have been observed if present. Observed off site east of Johnson Canyon.
Little mousetail (<i>Myosurus minimus</i> ssp. <i>apus</i>)	--/-- CNPS List 3.1	Moderate. Habitat in vernal pools and alkaline marshes. Would have been detected if present.
Spreading navarretia (<i>Navarretia fossalis</i>)	FT/-- CNPS List 1B.1 MSCP Covered	High. Habitat in vernal pools. Previously observed by Dudek (1992) on site in 1 vernal pool.
Snake cholla (<i>Opuntia californica</i> var. <i>californica</i>)	--/-- CNPS List 1B.1 MSCP NE	Low. Found in chaparral and coastal sage scrub. Would have been detected if present.
California Orcutt grass (<i>Orcuttia californica</i>)	FE/SE CNPS List 1B.1 MSCP NE	Low. Found in vernal pools but would have been detected if present on site.
Short-lobed broom-rape (<i>Orobanche parishii</i> ssp. <i>brachyloba</i>)	--/-- CNPS List 4.2	Moderate. Found in sandy soils, coastal bluff scrub, coastal dunes, and coastal sage scrub.
Nuttall's scrub oak (<i>Quercus dumosa</i>)	--/-- CNPS List 1B.1	Low. Found in chaparral and coastal sage scrub. Would have been detected if present.
Munz's sage (<i>Salvia munzii</i>)	--/CEQA CNPS List 2.2	Low. Chaparral and coastal sage scrub. Would have been detected if present.
Parry's tetraococcus (<i>Tetraococcus dioicus</i>)	--/-- CNPS List 1B.2 MSCP Covered	Low. Found in chaparral and coastal sage scrub. Would have been detected if present.
San Diego sunflower (<i>Viguiera laciniata</i>)	--/-- CNPS List 4.2	Moderate to high. Found in coastal sage scrub and has been observed on adjacent sites.

*Refer to Appendix E for a listing and explanation of status and sensitivity codes



Appendix C

ANIMAL SPECIES OBSERVED OR DETECTED



Appendix C
ANIMAL SPECIES OBSERVED OR DETECTED – LONESTAR RIDGE§

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>HABITAT*</u>
INVERTEBRATES		
<u>Crustaceans</u>		
Branchinectidae – Fairy Shrimp		
<i>Branchinecta sandiegonensis</i> †	San Diego fairy shrimp	
VP		
<i>Streptocephalus woottoni</i> ††	Riverside fairy shrimp	VP
<u>Insects</u>		
Lepidoptera – Butterflies and Moths		
<i>Anthocharis sara</i>	Sara orangetip	NNG
<i>Apodemia mormo virgulti</i>	Behr’s metalmark	NNG, DCSS
<i>Brephidium exilis</i>	pygmy blue	NNG, DCSS
<i>Coenonympha californica</i>	California ringlet	NNG
<i>Calephelis wrightii</i>	Wright’s metalmark	NNG
<i>Danaus gilippus</i>	queen	NNG
<i>Erynnis funeralis</i>	funeral duskywing	NNG
<i>Euphydras editha quino</i> †	Quino checkerspot butterfly	NNG, DCSS
<i>Hylephila phyleus</i>	fiery skipper	NNG
<i>Icaricia acmon</i>	acmon blue	NNG, DCSS
<i>Leptotes marina</i>	marine blue	NNG
<i>Nymphalis antiopa</i>	mourning cloak	NNG
<i>Papilio eurymedon</i>	pale swallowtail	NNG
<i>Papilio glaucas</i>	tiger swallowtail	NNG
<i>Papilio zelicaon</i>	anise swallowtail	NNG
<i>Junonia coenia</i>	buckeye	NNG
<i>Pieris rapae</i>	cabbage white	NNG
<i>Pontia protodice</i>	common white	NNG
<i>Pyrgus communis</i>	checkered skipper	NNG
<i>Speyeria callippie comstocki</i>	Comstock’s fritillary	NNG
<i>Vanessa annabella</i>	west coast lady	NNG, DCSS
<i>Vanessa atalanta</i>	red admiral	NNG
<i>Vanessa cardui</i>	painted lady	NNG, DCSS
<u>Arachnids</u>		
Theraphosidae – Tarantulas		
<i>Aphonopelma</i> sp.	tarantula	NNG

Appendix C (cont.)
ANIMAL SPECIES OBSERVED OR DETECTED – LONESTAR RIDGE§

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>HABITAT*</u>
VERTEBRATES		
<u>Amphibians</u>		
Scaphiopodidae (spadefoot toads) <i>Spea hammondi</i> †† (dry)	spadefoot toad	VP
<u>Reptiles</u>		
Phrynosomatidae – Earless, Spiny, Tree, Side-blotched, and Horned Lizards <i>Sceloporus occidentalis</i>	western fence lizard	DCSS
Scincidae – Skinks <i>Eumeces skiltonianus interparietalis</i> †	Coronado skink	DCSS
Viperidae – Pit Vipers <i>Crotalus viridis</i>	western rattlesnake	DCSS
<u>Birds</u>		
Accipitridae – Hawks, Kites, and Eagles <i>Accipiter cooperii</i> †† <i>Buteo jamaicensis</i> <i>Circus cyaneus</i> †† <i>Elanus leucurus</i> ††	Cooper’s hawk red-tailed hawk northern harrier white-tailed kite	NNG NNG, DCSS NNG, DCSS NNG
Aegithalidae – Bushtit <i>Psaltiriparus minimus</i>	bushtit	DCSS
Alaudidae – Larks <i>Eremophila alpestris actia</i> †	California horned lark	NNG
Cardinalidae – Cardinals <i>Guiraca caerulea</i>	blue grosbeak	DCSS
Charadriidae – Plovers <i>Charadrius vociferous</i>	killdeer	NNG
Columbidae – Pigeons and Doves <i>Zenaida macroura</i>	mourning dove	NNG

Appendix C (cont.)
ANIMAL SPECIES OBSERVED OR DETECTED – LONESTAR RIDGE§

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>HABITAT*</u>
VERTEBRATES (cont.)		
<u>Birds</u> (cont.)		
Corvidae – Jays, Magpies, and Crows		
<i>Aphelocoma californica</i>	western scrub jay	DCSS
<i>Corvus brachyrhynchos</i>	American crow	DCSS
<i>Corvus corax</i>	common raven	NNG, DCSS
Emberizidae – Sparrows, Longspurs, and Emberiza Buntings		
<i>Aimophila ruficeps canescens</i> ††	southern California rufous-crowned sparrow	DCSS
<i>Ammodramus savannarum</i> ††	grasshopper sparrow	NNG
<i>Melospiza melodia</i>	song sparrow	DCSS
<i>Passerculus sandwichensis</i>	savannah sparrow	DCSS
<i>Pipilo crissalis</i>	California towhee	DCSS
<i>Pipilo maculatus</i>	spotted towhee	DCSS
<i>Unidentified</i>	sparrow	NNG
<i>Zonotrichia leucophrys</i>	white-crowned sparrow	DCSS
Parulidae – Wood-warblers		
<i>Dendrocia coronata</i>	yellow-rumped warbler	
Falconidae – Caracaras and Falcons		
<i>Falco sparverius</i>	American kestrel	DCSS
<i>Falco mexicanus</i> ††	prairie falcon	NNG
Fringillidae – Finches		
<i>Carpodacus mexicanus</i>	house finch	DCSS
<i>Carduelis psaltria</i>	lesser goldfinch	NNG, DCSS
Hirundinidae – Swallows		
<i>Hirundo pyrrhonota</i>	cliff swallow	DCSS
unidentified	swallow	DCSS
<i>Stelgidopteryx serripennis</i>	northern rough-winged swallow	NNG
Icteridae – Blackbirds		
<i>Euphagus cyanocephalus</i>	Brewer's blackbird	NNG
<i>Sturnella neglecta</i>	western meadowlark	NNG
Laniidae – Shrikes		

Appendix C (cont.)
ANIMAL SPECIES OBSERVED OR DETECTED – LONESTAR RIDGE§

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>HABITAT*</u>
VERTEBRATES (cont.)		
<u>Birds</u> (cont.)		
<i>Lanius ludovicianus</i> ††	loggerhead shrike	NNG
Laridae – Gulls, Terns, and Skimmers <i>Larus</i> sp.	gull	NNG, DCSS
Mimidae – Mockingbirds and Thrashers <i>Mimus polyglottos</i>	northern mockingbird	NNG
Picidae – Woodpeckers, Flickers, and Sapsuckers <i>Colaptes auratus</i>	northern flicker	DCSS
Scolopacidae – Sandpipers, and Phalaropes <i>Numenius americanus</i> ††	long-billed curlew	NNG
Strigidae – Typical Owls <i>Athene cunicularia</i> †	burrowing owl	NNG
Sturnidae – Starlings <i>Sturnus vulgaris</i>	European starling	NNG
Sylviidae – Old World Warblers, and Gnatcatchers <i>Polioptila californica californica</i> ††	coastal California gnatcatcher	DCSS
Timaliidae – Babblers <i>Chamaea fasciata</i>	wrentit	DCSS
Trochilidae – Hummingbirds <i>Calypte anna</i> <i>Calypte costae</i>	Anna's hummingbird Costa's hummingbird	DCSS NNG
Troglodytidae – Wrens <i>Thryomanes bewickii</i> <i>Troglodytes aedon</i>	Bewick's wren house wren	DCSS DCSS
Turdidae – Thrushes <i>Sialia currucoides</i>	mountain bluebird	DCSS

Appendix C (cont.)
ANIMAL SPECIES OBSERVED OR DETECTED – LONESTAR RIDGE§

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>HABITAT*</u>
-------------------------------	---------------------------	------------------------

VERTEBRATES (cont.)

Birds (cont.)

Tyrannidae – Tyrant Flycatchers, Phoebe, and Kingbirds		
<i>Sayornis nigricans</i>	black phoebe	DCSS
<i>Sayornis saya</i>	Say's phoebe	DCSS
<i>Tyrannus sp.</i>	kingbird	DCSS
<i>Tyrannus vociferans</i>	Cassin's kingbird	DCSS

Mammals

Canidae – Foxes, Wolves, and Relatives		
<i>Canis latrans</i>	coyote (scat)	NNG, DCSS
Felidae – Cats		
<i>Lynx rufus</i>	bobcat (scat)	NNG, DCSS
Geomyidae – Pocket Gophers		
<i>Thomomys bottae</i>	Botta's pocket gopher (burrows)	NNG
Leporidae – Rabbits and, Hares		
<i>Lepus californicus bennettii</i> ††	San Diego black-tailed jackrabbit (scat)	DCSS
<i>Sylvilagus audubonii</i>	desert cottontail (scat, observations)	DCSS
Muridae – Rats, Mice, and Voles		
<i>Neotoma sp.</i>	woodrat (scat)	DCSS
Procyonidae – Raccoons		
<i>Procyon lotor</i>	common raccoon (tracks)	DCSS

§Species list is for the entire 273-acre Lonestar Ridge site, which encompasses the 82-acre biological open space (BOS) proposed as partial mitigation for impacts associated with Otay Crossings Commerce Park.

†Denotes sensitive species observed within the BOS

††Denotes sensitive species observed outside of the BOS

*Habitat Acronyms: DCSS=Diegan coastal sage scrub, NNG=Non-native grassland, VP=Vernal pool.

THIS PAGE INTENTIONALLY LEFT BLANK

A blue decorative shape in the top right corner, consisting of a rectangle with a curved left edge tapering to a point.

Appendix D

SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR



Appendix D
SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR

SPECIES	STATUS*	POTENTIAL/HABITAT
INVERTEBRATES		
Hermes copper (<i>Lycaena hermes</i>)	--/--	Low. Host plant spiny redberry (<i>Rhamnus crocea</i>) does not occur on site.
Thorne's hairstreak butterfly (<i>Mitoura thornei</i>)	--/-- MSCP Rare, NE	Low. Host plant Tecate cypress (<i>Cupressus forbesii</i>) is not present on site.
Riverside fairy shrimp (<i>Streptocephalus woottoni</i>)	FE/-- MSCP NE	Moderate. Has been observed in pools within project vicinity although not within the BOS. Pools within BOS may not be deep enough to support this species.
VERTEBRATES		
Amphibian		
Western spadefoot (<i>Spea hammondi</i>)	--/SSC	High. Observed in dry vernal pools during 2006 surveys on larger Lonestar Ridge property.
Reptiles		
Orange-throated whiptail (<i>Aspidoscelis hyperythra</i>)	--/SSC MSCP Covered	High in shrub habitats on site.
Coastal western whiptail (<i>Aspidoscelis tigris stejnegeri</i>)	--/--	High in shrub habitats.
Northern red-diamond rattlesnake (<i>Crotalus ruber ruber</i>)	--/SSC	Moderate in coastal sage scrub and rocky areas.
San Diego ringneck snake (<i>Diadophis punctatus similis</i>)	--/--	Moderate in grasslands or coastal sage scrub.
Coronado skink (<i>Eumeces skiltonianus interparietalis</i>)	--/SSC	High. Observed in sage scrub in off-site portions of Lonestar Ridge.
Rosy boa (<i>Charina trivirgata</i>)	--/--	Moderate near rocky areas in coastal sage scrub.
Coast horned lizard (<i>Phrynosoma coronatum</i>)	--/SSC MSCP Covered	High in coastal sage scrub. Main food source is harvester ant, which was not seen but probably is present. Observed by Dudek (1992).
Two-striped garter snake (<i>Thamnophis hammondi</i>)	--/SSC	Moderate near vernal pool habitats.
Birds		
Cooper's hawk (<i>Accipiter cooperii</i>)	--/WL	Low. Appropriate habitat does not occur on site. Observed off site in eucalyptus woodland.
Tricolor blackbird (<i>Agelaius tricolor</i>)	BCC/SSC MSCP Covered	Moderate as a winter visitor and as a migrant. Occurs mostly in grasslands and wetlands. Known from the Otay River.

Appendix D (cont.)
SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR

SPECIES	STATUS*	POTENTIAL/HABITAT
VERTEBRATES (cont.)		
Birds (cont.)		
Southern California rufous-crowned sparrow (<i>Aimophila ruficeps canescens</i>)	--/WL MSCP Covered	Moderate to high in coastal sage scrub. Species has been observed in larger Lonestar Ridge property, outside of the BOS.
Bell's sage sparrow (<i>Amphispiza belli belli</i>)	BCC/WL	Moderate in sage scrub and chaparral communities.
Golden eagle (<i>Aquila chrysaetos</i>)	BCC/WL Fully Protected MSCP Covered	High to forage in open or shrubby habitats. Tends to require places of solitude and is usually found at a distance from human habitation.
Ferruginous hawk (<i>Buteo regalis</i>)	BCC/WL MSCP Covered	High to forage in grasslands and agricultural fields.
Coastal cactus wren (<i>Campylorhynchus brunneicapillus sandiegensis</i>)	BCC/SSC MSCP Covered	Low. Appropriate habitat does not occur on site. Observed off site in Johnson Canyon.
Turkey vulture (<i>Cathartes aura</i>)	--/--	High, with foraging potential abundant.
Mountain plover (<i>Charadrius montanus</i>)	BCC/SSC MSCP Covered	Low. A rare visitor to San Diego County during winter, found in short-statured grasslands and fields.
Northern harrier (<i>Circus cyaneus</i>)	--/SSC MSCP Covered	High to forage; moderate to nest. Species has been observed off site.
Merlin (<i>Falco columbarius</i>)	--/WL	Moderate in winter on site in the open grasslands.
Prairie falcon (<i>Falco mexicanus</i>)	BCC/WL	Moderate for foraging. Species has been observed flying over the 273-acre Lonestar site.
Peregrine falcon (<i>Falco peregrinus</i>)	BCC/SE Fully Protected	Low. Rare visitor to coastal areas of San Diego.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	BCC/SSC	High for foraging. Species has been observed just south of the 62-acre parcel.
Coastal California gnatcatcher (<i>Poliophtila californica californica</i>)	FT/SSC	Moderate to high in sage scrub in the 20-acre parcel. Numerous off-site observations have occurred in the vicinity of Johnson Canyon.
Least Bell's vireo (<i>Vireo bellii pusillus</i>)	FE/SE MSCP Covered	Low. Appropriate habitat does not occur on site. Observed off site in Johnson Canyon.
Mammals		
California pocket mouse (<i>Chaetodipus californicus femoralis</i>)	--/SSC	Moderate in scrubby areas. Trapping necessary for detection but not warranted due to relatively low sensitivity.
Northwestern San Diego pocket mouse (<i>Chaetodipus fallax fallax</i>)	--/SSC	Moderate. Coastal sage scrub and ruderal areas. Trapping necessary for detection but not warranted due to relatively low sensitivity.

Appendix D (cont.) SENSITIVE ANIMAL SPECIES WITH POTENTIAL TO OCCUR		
SPECIES	STATUS*	POTENTIAL/HABITAT
VERTEBRATES (cont.)		
Mammals (cont.)		
Greater western mastiff bat (<i>Eumops perotis californicus</i>)	--/SSC	Moderate foraging potential in coastal sage scrub and grassland areas. Focused surveys required for detection but not warranted due to relatively low sensitivity.
Mountain lion (<i>Felis concolor</i>)	--/-- MSCP Covered	Moderate. Main prey is mule deer, which has high potential to occur on site.
San Diego black-tailed jackrabbit (<i>Lepus californicus bennettii</i>)	--/SSC	High in grassland habitat on the mesa. Species has been observed in the vicinity.
San Diego desert woodrat (<i>Neotoma lepida intermedia</i>)	--/SSC	Moderate. Coastal sage scrub and other xeric areas are habitat. Trapping necessary for detection but not warranted due to relatively low sensitivity.
Southern mule deer (<i>Odocoileus hemionus fuliginata</i>)	--/-- MSCP Covered	High in grassland and sage scrub on site.
Southern grasshopper mouse (<i>Onychomys torridus ramona</i>)	--/SSC	Moderate. Could occur in arid habitats, including all shrublands. Trapping necessary for detection, but not warranted due to relatively low sensitivity.
Pacific pocket mouse (<i>Perognathus longimembris pacificus</i>)	FE/SSC	None. Occasionally found in coastal sage scrub along immediate coast. Trapping necessary for detection but not warranted, with appropriate habitat for species not occurring on site.

*Refer to Appendix E for a listing and explanation of status and sensitivity codes

THIS PAGE INTENTIONALLY LEFT BLANK



Appendix E

EXPLANATION OF STATUS CODES FOR PLANT AND ANIMAL SPECIES



Appendix E
EXPLANATION OF STATUS CODES FOR PLANT AND ANIMAL SPECIES

FEDERAL, STATE, AND LOCAL CODES

U.S. Fish and Wildlife Service (USFWS)

FE	Federally listed endangered
FT	Federally listed threatened
BCC	Birds of Conservation Concern

California Department of Fish and Game (CDFG)

SE	State listed endangered
ST	State listed threatened
SR	State listed rare
SSC	State species of special concern
WL	Watch list
Fully Protected	Fully Protected species may not be taken or possessed without a permit from the Fish and Game Commission and/or CDFG.

County of San Diego

Plant sensitivity:

Group A	Plants rare, threatened or endangered in California or elsewhere
Group B	Plants rare, threatened or endangered in California but more common elsewhere
Group C	Plants that may be quite rare, but more information is needed to determine rarity status
Group D	Plants of limited distribution and are uncommon, but not presently rare or endangered

OTHER CODES AND ACRONYMS

Multiple Species Conservation Program (MSCP) Covered

Multiple Species Conservation Program covered species for which the County has take authorization within MSCP area.

MSCP Narrow Endemic (NE) Species

Some native species, primarily plants with restricted geographic distributions, soil affinities, and/or habitats, are referred to as narrow endemic species. For vernal pools and identified narrow endemic species, jurisdictions will specify measures in their respective subarea plans to ensure that impacts to these resources are avoided to the maximum extent practicable.

Appendix E (cont.)
EXPLANATION OF STATUS CODES FOR PLANT AND ANIMAL SPECIES

OTHER CODES AND ACRONYMS (cont.)

California Native Plant Society (CNPS) Codes

Lists	List/Threat Code Extensions
1A = Presumed extinct.	.1 = Seriously endangered in California (over 80 percent of occurrences threatened/high degree and immediacy of threat)
1B = Rare, threatened, or endangered in California and elsewhere. Eligible for state listing.	.2 = Fairly endangered in California (20 to 80 percent occurrences threatened)
2 = Rare, threatened, or endangered in California but more common elsewhere. Eligible for state listing.	.3 = Not very endangered in California (less than 20 percent of occurrences threatened, or no current threats known)
3 = Distribution, endangerment, ecology, and/or taxonomic information needed. Some eligible for state listing.	A CA Endemic entry corresponds to those taxa that only occur in California.
4 = A watch list for species of limited distribution. Needs monitoring for changes in population status. Few (if any) eligible for state listing.	All List 1A (presumed extinct in California) and some List 3 (need more information; a review list) plants lacking threat information receive no threat code extension. Threat Code guidelines represent only a starting point in threat level assessment. Other factors, such as habitat vulnerability and specificity, distribution, and condition of occurrences, are considered in setting the Threat Code.